

415. Assessment of physical activity, exercise, muscle function and clinical characteristics as outcomes in physiotherapy and rehabilitation

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Adequate physical activity in students with and without asthma

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Background: Early youth is decisive for the adoption of opinions concerning the physical activity which contributes to the decrease of death risk due to chronic diseases.

Aim: To examine differences in physical activities in young students with and without asthma.

Method: 578 Physical therapy students in Athens, Greece, aged 18-30 (± 2.07) participated in the study. Adequate physical activity was assessed according to the guidelines of the American Cardiology Association and the American College of Sports Medicine (yes-no). Differences in physical activity between students with and without asthma were examined through χ^2 .

Results: Only the 4.3% of the total sample reported diagnosed asthma. Adequate physical activity was stated by 40% of students with asthma and by 55.3% of students without asthma. No significant differences were found in physical activity between the two groups ($p=0.132$). Students with asthma didn't differ in physical activity regarding gender, BMI, sleep duration, alcohol consumption, income, and health-belief ($p>0.05$), while they differed as for smoking ($p=0.018$). Students without asthma didn't differ ($p>0.05$) in physical activity with regard to BMI, sleep duration, alcohol consumption smoking, income, and their health-belief, while they revealed differences as for sex ($p<0.001$).

Conclusion: The results of the present study in one hand are encouraging because students with asthma were as active as those without asthma, but in the other hand they are disappointing because both groups didn't met American guidelines for the adequate physical activity that have shown to contribute to chronic illnesses prevention.

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Cardiorespiratory fitness, pulmonary function and C-reactive protein levels in adults with diabetes

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Background/Aim: Diabetes Mellitus (DM) is associated with impairment of cardiorespiratory fitness and pulmonary function; increasing evidences have suggested that comorbidities and systemic inflammation may be involved. The objective of this study was evaluate changes in metabolic variables, C-reactive protein (CRP) levels, cardiorespiratory fitness and pulmonary function in DM patients compared with healthy subjects.

Methods: 19 men with diabetes (49 ± 2 years) and 19 healthy control subjects (51 ± 1 years) were studied. All subjects performed a spirometry and an incremental cardiopulmonary exercise test on a cycloergometer with electromagnetic breaking (workload increases, range 13-22W/min). Cardiopulmonary data were continuously collected with a metabolic unit. Heart rate (HR) was continuously monitored.

Results: See table 1.

Table 1. Lung function, physical capacity parameters and CRP levels

	Control (n=19)	DM (n=19)	P-values
CRP (mg/L)	0.66 \pm 0.15	0.88 \pm 0.21	NS
HbA1c (%)	5.73 \pm 0.01	8.39 \pm 0.36	<0.001
FVC (% pred)	101.0 \pm 2.1	103.4 \pm 3.0	NS
FEV1 (% pred)	99.3 \pm 2.5	103.9 \pm 3.0	NS
FEV1/FVC	80.4 \pm 1.2	82.2 \pm 0.9	NS
FEF 25-75% (% pred)	100.6 \pm 6.6	115.6 \pm 5.8	NS
PEF (% pred)	94.7 \pm 5.0	89.9 \pm 3.5	NS
Peak HR (beats/min)	149 \pm 3	139 \pm 2	0.009
Work load (Watts)	158 \pm 5	135 \pm 6	0.005
RER	1.08 \pm 0.02	1.14 \pm 0.03	0.044
VO2peak (ml/kg/min)	24.17 \pm 0.7	18.91 \pm 0.7	<0.001
VO2AT (ml/kg/min)	14.11 \pm 0.8	12.17 \pm 2.5	0.044

Means \pm SE. Student t test ($p<0.05$).

Conclusion: The cardiorespiratory fitness is reduced in patients with diabetes but the spirometric values are preserved, and the CRP did not differ of the control subjects.

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Respiratory function, functional capacity, and physical activity in patients with scleroderma

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Aim: Scleroderma is a chronic multisystem disease of unknown origin, characterized by fibrosis on the connective tissue of skin and internal organs. Because of pulmonary involvement, patients' exercise tolerance is poor and functional capacity is impaired. The purpose of this study was to compare lung function, functional capacity, and physical activity, between patients with scleroderma and healthy controls.

Materials and methods: Ten scleroderma patients (9F, 1M, 53.3 ± 9.4 years) and ten healthy controls (8F, 2M, 45.5 ± 12.6 years) participated in the study. Pulmonary function test was performed using spirometry. Functional capacity was evaluated using six-minute walk test (6MWT). Heart rate, oxygen saturation, dyspnea and fatigue perception using modified Borg Scale was recorded before and after the test. Subject's physical activity level was assessed using the International Physical Activity Questionnaire (IPAQ).

Results: All scleroderma patients involved in this study had interstitial lung involvement. The FEV₁, FEF_{25-75%}, and 6MWT distance were significantly, lower in patients with scleroderma ($p<0.05$). The %6MWT distance of the patients was $64.5\pm 23.2\%$. Oxygen desaturation, dyspnea and fatigue perception at the end of 6MWT were significantly higher in patients with scleroderma as compared with the healthy controls ($p<0.05$). The IPAQ moderate physical activity score and IPAQ total score were significantly lower in patients with scleroderma ($p<0.05$).

Conclusions: Lung function, functional exercise capacity, and physical activity level is adversely affected in patients with scleroderma. Exercise training programs may be useful in scleroderma patients.

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Effects of exacerbation risk on symptoms and clinical characteristics in patients with bronchiectasis

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Aim: Exacerbations may deteriorate symptoms and clinical features in patients with bronchiectasis. The purpose of this study was to investigate effects of exacerbation risk on muscle strength, exercise capacity, dyspnea, fatigue, and quality of life in patients with bronchiectasis.

Methods: Fifteen low risk patients (0 exacerbation per year) and 15 high risk patients (≥ 1 exacerbations per year) participated in this study. Lung function, quadriceps muscle strength (hand held dynamometer), dyspnea (modified Medical Research Council dyspnea scale, MRC), fatigue (Fatigue Severity Scale, FSS), exercise capacity (six-minute walk test, 6MWT), and cough specific (Leicester Cough Questionnaire, LCQ) and general (Nottingham Health Profile, NHP) were determined.

Results: No significant difference was found in lung function between the groups ($p>0.05$). Number of females was significantly higher in high risk group as compared to low risk group ($p<0.05$). Quadriceps muscle strength, 6MWT distance, and LCQ physical score were significantly lower; and MRC, FSS score, and NHP energy, emotional reactions, pain, physical mobility, and total scores were significantly higher in high risk bronchiectasis patients than those of low risk patients ($p<0.05$).

Conclusion: High risk of having exacerbations adversely effects quadriceps strength; exercise capacity, dyspnea and fatigue perception, and cough specific and general health in patients with bronchiectasis. Number of exacerbations in the previous year may be a determinant of characteristics and function in bronchiectasis.

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Comparison of functional capacity, muscle strength, body composition in patients with cystic fibrosis, non-cystic bronchiectasis and healthy controls
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Aim: We aimed to compare functional capacity, respiratory and peripheral muscle strength, and body composition in patients with cystic fibrosis, non-cystic bronchiectasis and healthy controls.

Methods: 43 with bronchiectasis, 36 patients with cystic fibrosis, and 35 age-sex matched controls were included. Body composition was evaluated using bioelectrical impedance analysis. Pulmonary function test was performed. Respiratory muscle strength (MIP and MEP) was evaluated using a mouth pressure device, quadriceps muscle strength using a dynamometer, functional capacity using six-minute walk test (6MWT).

Results: The weight, height, body mass index (BMI), and fat free mass, pulmonary functions, MIP and MEP, quadriceps muscle strength, 6MWT distance, were significantly lower in patients with bronchiectasis and cystic fibrosis compared with healthy controls ($p < 0.05$). 24 patients (56%) with bronchiectasis, 23 (64%) patients with cystic fibrosis had malnutrition. 12 (28%) bronchiectasis, 16 (44%) cystic fibrosis patients' MIP were weaker than 95%CI (80-150 cmH₂O) of the controls. 8 (19%) bronchiectasis, 8 (22%) cystic fibrosis patients' 6MWT distance were shorter than 95%CI (576-871 m) of the controls. 9 (21%) bronchiectasis, 7 (19%) cystic fibrosis patients' quadriceps muscle were weaker than 95%CI (160-500 N) of the controls.

Conclusion: Body composition, pulmonary function, respiratory and peripheral muscle strength and functional capacity are impaired in bronchiectasis and cystic fibrosis patients. Malnutrition may lead these impairments. Pulmonary rehabilitation programs should be adjusted to improve these outcomes.

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Peripheral and respiratory muscle strength in pulmonary artery hypertension

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Background and aim: Pulmonary arterial hypertension (PAH) is a rare pulmonary vascular disease characterized by increased pulmonary arterial pressure. The PAH patients experience dyspnea and fatigue limiting performance in activities of daily life. The aim of this study was to compare lung function, respiratory muscle strength, and peripheral muscle strength between patients with PAH and healthy subjects.

Materials and methods: Seventeen patients with PAH (4 M, 13 F) and fifteen age-matched healthy controls (7 M, 8 F) participated in this study. Pulmonary function test was performed using spirometry. Respiratory muscle strength was measured using a mouth pressure device. Lower and upper peripheral muscle strength was measured from quadriceps femoris, shoulder abductors a hand held dynamometer, and hand grip was recorded.

Results: The mean pulmonary arterial pressure was 63.57±31.77 mmHg. In PAH patients, maximal inspiratory pressure was significantly correlated with mean pulmonary arterial pressure ($r = -0.67$, $p < 0.05$). The mean maximal inspiratory ($p < 0.0001$) and expiratory muscle pressures ($p = 0.001$) of patients with PAH were significantly lower than those of healthy controls. Quadriceps muscle force ($p = 0.05$), shoulder abduction force ($p < 0.0001$), and hand grip force ($p = 0.018$) were significantly lower in patients with PAH as compared with healthy controls.

Conclusions: High pulmonary arterial pressure results in reduced peripheral, inspiratory and expiratory muscle strength. Effects of respiratory and peripheral muscle training in patients with PAH needs further investigation.

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Comparison of exercise capacity, pulmonary functions, respiratory and peripheral muscle strength between patients with idiopathic pulmonary arterial hypertension and Eisenmenger syndrome

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This study was designed to compare exercise capacity, pulmonary functions, respiratory and peripheral muscle strength between patients with idiopathic pulmonary arterial hypertension (IPAH) and Eisenmenger syndrome. Thirty-three patients with

PAH of either IPAH (mean age 45.31; 12 female and 4 male) or Eisenmenger syndrome (mean age 38.41; 10 female and 7 male) were studied. Exercise capacity was determined by using six minute walk test. Also pulmonary functions, respiratory muscle strength (maximal inspiratory (MIP) and maximal expiratory (MEP) pressure) and handgrip strength were measured. Unpaired-t, Mann-Whitney and Fisher's exact tests have been used for the statistical analysis of the data. There were no significant differences in exercise capacity, respiratory and peripheral muscle strength between the two groups. FVC% ($p = 0.0025$), FEV₁% ($p = 0.01$) and PEF% ($p = 0.02$) of patients with Eisenmenger syndrome were significantly lower than those of patients with IPAH. In conclusion; exercise capacity, respiratory and peripheral muscle strength were similar for patients with Eisenmenger syndrome compared to those IPAH. In addition, the present study provides evidence that pulmonary functions are reduced in patients with Eisenmenger syndrome compared with IPAH.

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Associations between measurements of health related quality of life (HRQoL) and physical activity (PA) in patients with interstitial lung disease (ILD)
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Purpose: PA is not well studied in patients with ILD. It is unknown to what extent PA relates to HRQoL in these patients. The aim of this study was to investigate associations between HRQoL and PA.

Methods: We studied 54 patients with ILD (Age: 64m11 years; FVC: 81m23%; DLCO: 45±13%). HRQoL was assessed by the Chronic Respiratory Disease Questionnaire (CRDQ) and the Saint Georges Respiratory Questionnaire (SGRQ). The SenseWear Armband was used to assess PA. Mean steps (STEPS) and moderate intense activity (MOD PA) were calculated over 7 consecutive days.

Results: Baseline characteristics are presented in Table 1.

Table 1. Baseline characteristics

MRC	2.7±0.9
6MWD (Meter)	482±112
SGRQ (Total)	40.9±15.2
CRDQ (Total)	86.0±16.7
STEPS (N/Day)	6255±3343
MOD PA (Min/Day)	24±38

Mean±SD.

Spearman Correlation Coefficients were used to examine relationships between HRQoL questionnaires and PA (Table 2). The SGRQ and CRDQ correlated modestly to each other ($r = -0.57$; $p < 0.0001$). No strong correlations were found between HRQoL and relevant subdomains scores and measures of PA.

Table 2: Spearman Correlation Coefficients

	STEPS (N/Day)	MOD PA (Min/Day)
SGRQ (Total)	$r = -0.18$; $p = 0.20$	$r = -0.25$; $p = 0.08$
SGRQ (Activity)	$r = -0.20$; $p = 0.16$	$r = -0.11$; $p = 0.46$
CRDQ (Total)	$r = 0.07$; $p = 0.62$	$r = 0.17$; $p = 0.25$
CRDQ (Dyspnea)	$r = -0.17$; $p = 0.22$	$r = 0.03$; $p = 0.82$
CRDQ (Fatigue)	$r = 0.21$; $p = 0.14$	$r = 0.08$; $p = 0.58$

Conclusion: The SGRQ and CRDQ are measuring similar concepts but HRQoL is unrelated to PA levels in patients with ILD.

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Thoracoabdominal dyssynchrony and its relationship with muscle strength in patients with COPD: Preliminary results

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Background: Upper limbs (UL) exercises can generate thoracoabdominal dyssynchrony (TD), which increase the dyspnea in patients with COPD. However, it is unknown the influence of posture and inspiratory muscle strength (IMS) in TD.

Aim: To verify the TD in rest and UL exercises comparing sitting and standing posture and IMS.

Methods: Fifteen patients with COPD (FEV₁ 47±16%pred, age 66±9, MIP 58±21cmH₂O) performed flexion-extension exercises at the shoulder (1), above the shoulder (2) and horizontal abduction-adduction (3) in sitting and standing postures. The respiratory inductive plethysmography was performed (LifeShirt) and the Borg scale was reported. The PhRIB (Phase Relation during Inspiration),

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PhREB (during Expiration), PhRTB (Entire Breath) and PhAng (Phase Angle) were analysed (repeated measures test). In addition, patients were divided in two groups (MIP above and below 60%pred) (one-way ANOVA).

Results: The TD increased during exercises. There was a significant increase of the variables ($p<0.05$) during exercise situation compared to rest in both studied postures, without differences between them. The group with MIP below 60%pred showed higher dyssynchrony in exercise 1 in sitting, and exercise 3 in standing. There was no difference in dyspnea in both groups. Table 1 summarizes the results.

	PhRiB	PhREB	PhRTB	PhAng
Sitting rest vs sitting	1	1, 2	1, 2	
Standing rest vs standing	1, 2, 3	1, 2, 3	1, 2, 3	3
p-value	0.00	0.00	0.00	0.00

Conclusion: These preliminary results suggest that upper limb exercises cause TD independent of the postures adopted. In additional, the results suggest that the inspiratory muscle weakness seems get worse the dyssynchrony. RB is a fellow of CAPES.

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Correlation between daily physical activity using a compact accelerometer and clinical parameters in patients with COPD

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Background: Physical activity (PA) monitoring is becoming increasingly important in patients with COPD. However, the correlation between clinical parameters in COPD and PA has not yet been well studied.

Objective: To evaluate the correlation between PA using a compact accelerometer and clinical parameters in patients with COPD.

Methods: We studied daily physical activity in 30 stable COPD patients (29 males; 72.1±9.5 years of age; %FEV₁ 54.8±23.3%; GOLD classification I – 5 patients, II – 11, III – 7, IV – 7; BMI 21.8±3.2 kg/m²) using a single-axis accelerometer (Lifecorder, Suzuken, Japan) for 1 month. Five PA measures were monitored: total energy expenditure (kcal/day), number of steps per day, walking distance (meters/day), and the time spent performing PA (minutes/day) at light (below 3 metabolic equivalent values [METs]) and moderate (3–6 METs) intensities. Clinical parameters included age, BMI, MRC scale, %FEV₁, six minute walk test (6MWT; distance, oxygen saturation (SpO₂), heart rate, dyspnea and leg fatigue on Borg scale), and nutritional conditions (serum pre-albumin, transferrin, and retinol-binding protein [RBP]).

Results: Significant differences ($p<0.05$) were observed between GOLD classifications for age, BMI, MRC scale, serum pre-albumin, RBP, 6MWT distance, and minimal SpO₂ during the 6MWT. However, no significant differences were observed for Borg scale. Most clinical parameters were correlated significantly with at least 1 PA measure. Notably, Borg scale and MRC scale were correlated with 4 and 3 items, respectively.

Conclusion: Borg scale, although not significantly different among GOLD classifications, and MRC scale were strongly correlated with PA.

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What is the relationship between inspiratory capacity and different measures of exercise capacity in patients with COPD?

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Background: Inspiratory capacity (IC) is an indirect measure of pulmonary hyperinflation in patients with chronic obstructive pulmonary disease (COPD), and may be a limiting factor to exercise capacity in this population. However, the relationship of IC with exercise capacity still needs to be better explored.

Objective: To investigate the relationship between inspiratory capacity and different measures of exercise capacity in subjects with COPD.

Methods: Thirty patients with COPD (16 men, 66±8 years, forced expiratory volume in the first second [FEV₁] 40±14% pred) were studied. Inspiratory capacity was assessed by post-bronchodilator spirometry, whereas exercise capacity was assessed by the following three tests: six-minute walking test (6MWT), incremental symptom-limited cycle ergometry test (ISL) and constant work rate cycle ergometry test (CWR), all tests performed according to international guidelines.

Results: In the 6MWT, IC (in liters) explained 18% ($p=0.02$) of the distance walked, whereas in the ISL it explained 23% ($p=0.008$) of maximum work load and 19% ($p=0.02$) of heart rate reached at the end of the test. In the CWR, IC showed only a simple negative correlation with oxygen saturation at the end of the test ($r=-0.48$).

Conclusion: The inspiratory capacity significantly contributes, albeit modestly, to some key variables of exercise capacity tests. This indicates that a greater ventilatory reserve may be related to better physical fitness, and hence to a lower chance of hyperinflation.

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Maximum voluntary ventilation is a better correlate of energy expenditure during simple activities of daily living than measures of airflow obstruction or respiratory muscle strength in patients with COPD

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Background: In patients with chronic obstructive pulmonary disease (COPD), the relationship between energy expenditure (EE) and measures of lung function has attracted attention. Weak to moderate associations were demonstrated between daily EE and measures of respiratory muscle strength, maximal voluntary ventilation (MVV), inspiratory capacity (IC) and forced expiratory volume in one second (FEV₁) in patients with moderate to severe disease. However, as this earlier work measured EE over a 12-hour period, it is unclear to what extent the EE elicited during individual and simple activities of daily living were associated with these measures of lung function.

Objective: To explore the extent to which energy expenditure (EE) elicited during individual and simple activities of daily living is associated with different measures of lung function in patients with COPD.

Methods: Thirty-six patients (20 males; FEV₁ 48±15% predicted; body mass index 25.7±8 kg·m⁻²) underwent assessment of lung function followed by measures of indirect calorimetry whilst performing five simple activities of daily living (modified from the Glittre-test).

Results: MVV was the only parameter of lung function associated with EE elicited during each activity of daily living as well as with the total EE over the 5 tasks ($0.39<r<0.54$, $p<0.05$).

Conclusion: These data highlight the limited extent to which traditional measures of lung function, such as the FEV₁, are related to the functional performance of patients with COPD, and confirm the role of MVV as a correlate of functionality in this population.

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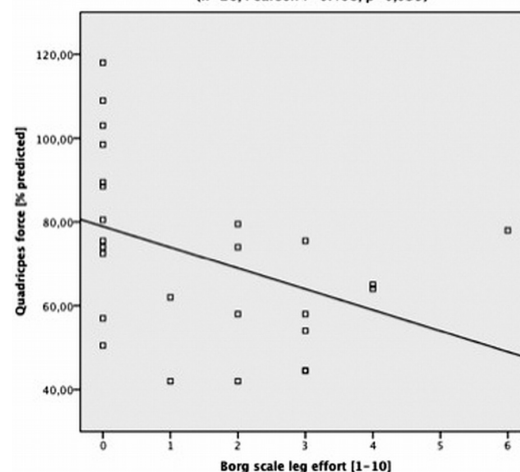
Sensation of leg effort at rest is related to lower peripheral muscle strength in patients with COPD

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Introduction: Sensation of leg effort (SLE) is known as a limiting factor in exercise capacity during a maximal exercise test in patients with COPD. The Borg scale scores this discomfort of the peripheral muscles before and during an exercise test. A high score in a maximal exercise test is known to correlate with lower skeletal muscle strength. However some patients experiencesome SLE l already at rest before the exercise test and other do not.

Objective: To evaluate if SLE at rest before exercise also could be related to peripheral muscle strength.

Correlation of leg effort before exercise test and peripheral muscle strength (n=26; Pearson r=0.408; p=0,039)



Methods: Data of 26 patients in a pulmonary rehabilitation program was analysed. The Borg scale SLE before the maximal incremental exercise test. Isometric quadriceps force was assessed by a computerized dynamometer during a voluntary maximal isometric contraction with the hip at 90° and the knee at 60° flexion. The highest value was taken.

Results: SLEs light to moderate inversely correlated with isometric quadriceps force which is expressed as the percentage of strength compared to that of a healthy individual (Pearson $r=0.408$; $p=0.039$).

Conclusions: Lower quadriceps force seems to relate to higher leg effort compared to those patients who do not experience any leg discomfort at all. However due to the great range in quadriceps force, it is necessary to objectively measure quadriceps force to have a good clinical impression of patient's peripheral muscle strength.

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Measurement of quadriceps strength in patients with COPD using a rig-supported handheld dynamometer

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Background: Quadriceps strength (QS) predicts prognosis in COPD. Measurement using a non portable isokinetic dynamometer (ID) is the gold standard. Handheld dynamometers (HHD) are portable, but measurements of QS obtained using unsupported HHD may be affected by operator strength. We therefore constructed a portable rig that can be bolted to a chair to support a HHD, and evaluated its performance in measurement of QS in COPD patients.

Objectives: To determine whether use of a rig to support a HHD reduces inter-observer variability in QS measurement, and generates data which correlate with those obtained using an ID.

Methods: Two operators (A-male, BMI 25.5 kg/m²; B-female, BMI 19.3 kg/m²) measured QS using unsupported HHD (12 patients) and rig-supported HHD (15 patients); values obtained for each patient were compared between operators. QS was then measured in 30 patients using both rig-supported HHD and ID; values obtained for each patient were compared between methods.

Results: Measurements of QS obtained using unsupported HHD differed between operator A vs. B (mean QS 49.5 kg vs 35.3 kg respectively; 95% CI for difference 5.9 to 22.6, $p=0.003$). Inter-observer variation was eliminated by use of the portable rig to support the HHD (mean QS 32.1 kg vs. 32.1 kg for operators A vs. B respectively; 95% CI for difference -1.4 to 1.5, $p=0.96$). Measures of QS using rig-supported HHD vs. ID were highly correlated ($r = 0.92$; 95% CI 0.76 to 0.97, $p < 0.001$).

Conclusions: Use of a portable rig to support a HHD in the measurement of QS in COPD patients eliminates observer effects, and generates values which correlate highly with those obtained using the gold standard methodology.

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A comparison of pulmonary function, functional exercise capacity and sleep quality in patients with chronic obstructive pulmonary disease and obstructive sleep apnea syndrome

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Aim: Chronic obstructive pulmonary disease (COPD) and obstructive sleep apnea syndrome (OSAS) are two diseases that are characterized by obstruction of pulmonary airways. The aim of this study was to compare pulmonary function, functional exercise capacity and sleep quality in patients with COPD and OSAS.

Materials and methods: Twenty-five COPD patients (21 M, 4 F) and 25 OSAS patients (16 M, 9 F) participated in the study. Pulmonary function were measured using a spirometer. Functional exercise capacity was evaluated using a six-minute walk test (6MWT). Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI).

Results: Parameters of pulmonary function, 6MWT distance and %6MWT distance were significantly lower in patients with COPD than those of OSAS ($p < 0.05$). In patients with COPD, Borg dyspnea and fatigue were significantly increased and oxygen saturation was significantly decreased during 6MWT compared with OSAS patients ($p < 0.05$). The PSQI sleep duration score was significantly lower, and PSQI sleep disturbances and subjective sleep quality scores were significantly higher in patients with OSAS ($p < 0.05$).

Conclusion: Pulmonary function and functional exercise capacity deteriorated in patients with COPD compared to OSAS patients. Exercise dyspnea and fatigue increases and oxygen saturation decreases in patients with COPD. In comparison with COPD patients, sleep duration and subjective sleep quality are adversely affected in patients with OSAS. Differences in sleep quality and exercise rat-

ings in patients with OSAS may require special attention when implementing rehabilitation programs.

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Evaluation of preoperative and postoperative exercise capacity by using six-minute walk test

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The aim of this study was to evaluate preoperative and postoperative exercise capacity of the patients by using six-minute walk test (6MWT) in patients electively undergone coronary artery bypass surgery. Twenty-nine patients whose mean age was 60.89 enrolled to the study. 6MWT was done at two time set (before operation and at discharge from hospital). Heart rate, blood pressure and oxygen saturation levels was noted. Level of dyspnea and fatigue determined by Borg scale before and after test and walking distances recorded after six minutes. Walking distance was 349 meters (66% of predicted values) before operation and 284 meters (54% of predicted values) after operation. Decrease of walking distance after operation was statistically significant (among measured and predicted values, $p < 0.0001$). Heart rate ($p=0.0002$), systolic blood pressure ($p=0.0002$), level of fatigue ($p=0.008$) was significantly increased before and after operation and also diastolic blood pressure ($p=0.01$) was significantly increased after operation after 6MWT. Decrease of oxygen saturation was significant both the tests before and after operations ($p=0.02$, $p=0.01$). Although heart rate, blood pressure, level of fatigue changes before and after 6MWT was not significant before and after CABG, decrease of oxygen saturation after CABG was significant ($p=0.004$). Conclusion of this study, CABG significantly reduces exercise capacity in the early postoperative course and although this reduce, similar increase of cardiopulmonary parameters and decrease level of oxygen saturation at the end of 6MWT emphasize that exercise induce cardiopulmonary overload in the post operative course.

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Using the six-minute walk test to assess exercise capacity in people with pulmonary hypertension

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Introduction: The aim of the study was to determine if there was a difference in six-minute walk distance (6MWD) when two six-minute walk tests (6MWTs) were performed in people with pulmonary hypertension (PH) prior to attendance at the PH clinic.

Methods: Participants with PH performed two 6MWTs for the first time prior to attendance at the PH Clinic. The tests were performed on a 32 metre continuous track in an outpatient hospital setting using standard instructions and encouragement.

Results: 212 participants completed two 6MWTs [mean (SD) age 57 (16) years; BMI 27 (6) kg/m²]. Using the better 6MWT the mean distance was 438 (139) metres and 6MWT % predicted was 87% (24). There was a significant increase in 6MWD on the second 6MWT [mean difference (95% CI) 16 m (9 to 23), $p < 0.0001$] with 66% of participants walking further on the second walk than the first walk. There were no adverse events during testing.

Conclusion: In people with PH, when a second 6MWT was performed the increase in walk distance was significant but small. This may indicate that one test at baseline may be adequate.

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Effects of radical treatment in patients with intrathoracic cancer

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Introduction: In patients (pts) with intrathoracic cancer radical treatment aims to prolong life and restore quality of life. Data on its effect on exercise capacity and muscle force are limited.

Aim: To investigate the effect of radical treatment on exercise capacity, muscle force and quality of life in pts with newly diagnosed intrathoracic cancer.

Methods: Exercise capacity, peripheral muscle force and quality of life were assessed before and after radical therapy. Data are presented as median with 95% CI.

Results (table): 117 pts (86 male, age: 64 y (47 - 77), BMI: 25 kg/m² (18 - 34), 40% COPD; 35 PY (0 - 70)) 105 NSCLC, 6 SCLC and 6 mesothelioma were enrolled: 50% underwent surgery as sole therapy, 12% surgery + chemotherapy, 24% chemotherapy + radiotherapy, 10% surgery + chemotherapy + radiotherapy

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and 4% radiotherapy only. 24 pts dropped out and 18 are still under treatment. The maximal exercise capacity and 6MWD decreased significantly after treatment (from 100 Watt (48 - 184) to 82 Watt (38 - 147) and from 515 m (388 - 632) to 482 m (328 - 617)), respectively. Fatigue and pain increased significantly after treatment: FACT-F from 9 pnts (3 - 30) to 13 pnts (3 - 33) and VAS pain from 1 pnts (0 - 9) to 2 pnts (0 - 8)).

majority of those children do not have an asthma diagnosis or asthma treatment. Only a minority of Swedish children have a self reported physical activity level that is in line with international recommendations.

	Before treatment	After treatment
FEV ₁ (%pred.)	88 (54 - 116)	72(48 - 106)*
VC (%pred.)	101 (92 - 111)	87 (72 - 104)*
DL _{CO} (%pred.)	73 (43 - 125)	55 (30 - 106)*
VO ₂ max (%pred.)	69 (39 - 109)	58 (33 - 83)*
VO ₂ max/kg (ml/min/kg)	20 (12 - 30)	16 (10 - 26)*
6MWD (%pred.)	77 (59 - 95)	63 (51 - 95)*
QF (%pred.)	67 (33 - 107)	61 (28 - 96)*
Max.Load (%pred.)	79 (43 - 137)	64 (30 - 115)*

*P<0.05.

Conclusion: Radical therapy for intrathoracic cancer significantly decreases exercise capacity, muscle force, and increases pain and fatigue. Mature data on all pts will be available at the meeting.

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Oxygen uptake is slower than heart rate on-kinetics in recent myocardial infarction patients

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Background: The heart rate (HR) and oxygen uptake (VO₂) on-kinetics analysis provides information about the individual response to aerobic exercise, which may be reduced after recent myocardial infarction (MI), mainly due to impairment in the oxygen transport system.

Design: To determine whether the HR and VO₂ onset dynamics were affected by recent MI, we evaluated the VO₂ and HR on-kinetics in three groups of subjects with preserved ventricular (VF) and pulmonary function (PF).

Methods: Eight men (49±8 years) with a recent MI (RMI), eleven men (52±7 years) with a late MI (LMI) and ten apparently healthy men (48±9 years) (CG) underwent to PF assessment, ramp cardiopulmonary exercise test (CPX) and two constant workload exercise tests (CWETs) on treadmill at moderate and high workloads, corresponding to 75% and 125% of the gas exchange threshold identified at CPX. VO₂ was registered breath-by-breath and analyzed after smoothed by moving averages of 8 respiratory cycles. HR was recorded by digital telemetry system. A monoexponential fit was applied to analyze VO₂ and HR on-transient response to the first 360 seconds of the CWETs. Intragroup and intergroup comparisons were realized (p<0.05).

Results: RMI group presented τVO₂ slower than τHR at moderate and high workloads. When compared to LMI and CG, RMI presented slower τVO₂ at high workload. All groups presented faster τHR and τVO₂ at moderate when compared to high workload.

Conclusion: Recent uncomplicated MI patients present slowing of τVO₂ at aerobic exercise, which suggests impairment of oxygen delivery and extraction mechanisms.

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Exercise induced dyspnea among 12-13 year old children

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Introduction: Many children are limited in their physical activity because of exercise induced dyspnea (EID).

Aim: The aim was to investigate the prevalence of EID, asthma and physical activity level among a population of 12-13 year old children in Uppsala, Sweden.

Method: A questionnaire was sent to 3815 parents asking them to answer the questionnaire together with their child.

Results: The response rate was 61% (n=2312). EID during the last 12 months was reported by 14.3% (n=330) (girls 16.9 vs. boys 11.8%, p<0.001). Of all the children reporting EID, 48% reported wheezing and 30% rhinitis during the last year, and 39% had ever had physician diagnosed asthma. Children with EID and asthma used bronchodilators and inhaled corticosteroids (ICS) to a larger extent than children with EID but no diagnosis of asthma (bronchodilators; 27.3 vs. 11.3%, p<0.01 and ICS; 31.2 vs. 4.4%, p<0.001). Only 12.4% of the total population (n=2312) reached the international physical activity recommendations (≥1 hour/day, 7 days/week on a moderate to vigorous level). 13% among children with EID and 12.3% in children without EID reached the recommendations (p=0.72).

Conclusion: Self reported exercise induced dyspnea is common in children and the