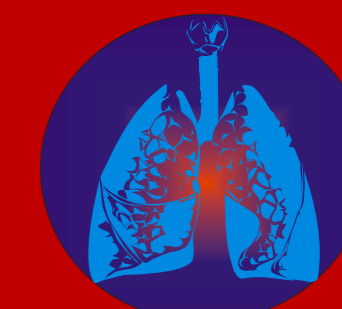# DAILY PHYSICAL ACTIVITY IN SEVERE CHRONIC OBSTRUCTIVE PULMONARY DISEASE ACCORDING TO NEW GOLD CLASSIFICATION AND COPD PHENOTYPES – first results from the Czech Multicentre Research Database of COPD

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INTRODUCTION

The level of daily physical activity (DPA) in relationship to chronic obstructive pulmonary disease (COPD) has previously been assessed in many studies. Most of them have confirmed that the level of DPA is decreased in higher stages of COPD. But there are not a lot of studies which observe the level of DPA according to COPD categories and COPD phenotypes.
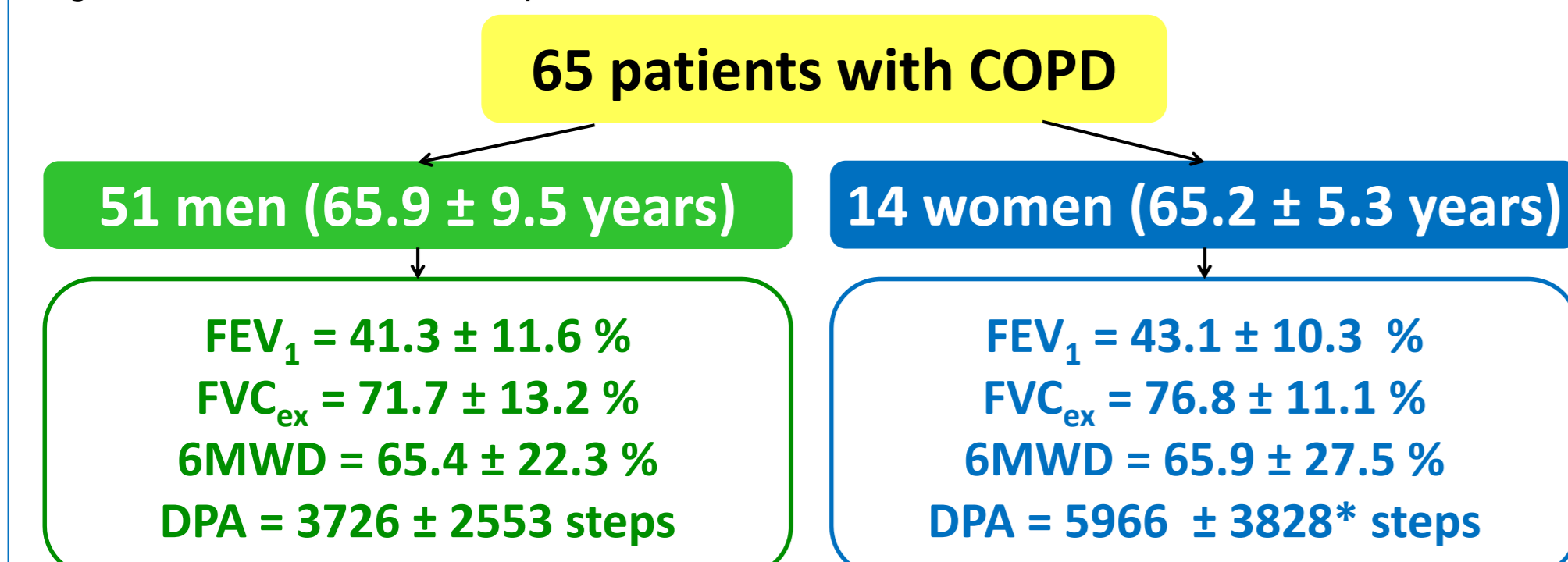
AIM

The main task of our study was to assess the relationship between the level of DPA, COPD categories and phenotypes in patients with severe COPD.

MATERIALS AND METHODS

Patients with stable severe COPD ($FEV_1 < 60\%$ of predicted) were enrolled from 4 centres from The Czech Multicentre Research Database of COPD (Figure 1).

Figure 1. Characteristics of patients with severe COPD

65 patients with COPD

51 men (65.9 ± 9.5 years)

14 women (65.2 ± 5.3 years)

FEV_1 = 41.3 ± 11.6 %
FVC_{ex} = 71.7 ± 13.2 %
6MWD = 65.4 ± 22.3 %
DPA = 3726 ± 2553 steps

FEV_1 = 43.1 ± 10.3 %
FVC_{ex} = 76.8 ± 11.1 %
6MWD = 65.9 ± 27.5 %
DPA = 5966 ± 3828* steps

Notes: FEV_1 – post-bronchodilator value of forced expiratory volume in 1 s, FVC_{ex} – post-bronchodilator value of forced vital capacity, 6MWD – 6-minute walk distance, DPA – daily physical activity, * p < 0.05 – statistically significant difference

The level of DPA was evaluated with pedometer (Digiwalker CW 600, Yamax, Japan) for one month. The number of steps per day was averaged over 30 days and presented as the DPA. A lung function test, a 6-minute walk test (6MWT), the St. George Respiratory Questionnaire (SGRQ), a COPD Assessment Test (CAT) and the Zung Self-rating Depression Scale were evaluated. An independent t-test was used for group analysis comparison.

RESULTS

We confirmed results from previous studies that the level of DPA correlates with forced expiratory volume in one second (r = 0.43, p = 0.001) and forced vital capacity (r = 0.34, p = 0.014), with the reached distance in 6MWT (r = 0.38, p = 0.005) and with the activity level and impact level assessed by SGRQ (r = 0.30, p = 0.027; r = 0.28, p = 0.044 respectively).

67.7 % of patients with severe COPD had less 5000 steps per day which represented a sedentary lifestyle. B and D categories represented the most frequent categories in our patients with severe COPD (Figure 2).

Figure 2. Number of patients in A-D categories

post-BDT FEV_1	4	C 4 patients	D 44 patients	≥ 2 exacerbation
	3			
	2	A 2 patients	B 15 patients	≤ 1 exacerbation
	1			
		CAT < 10	CAT ≥ 10	

Notes: post-BDT FEV_1 – post-bronchodilator value of forced expiratory volume in 1 s

Further analysis was performed for B and D category (Table 1). Most frequent phenotypes in these categories were: bronchitic, emphysematic or their combination. Frequent exacerbation was confirmed in 20 patients in D category (Figure 3).

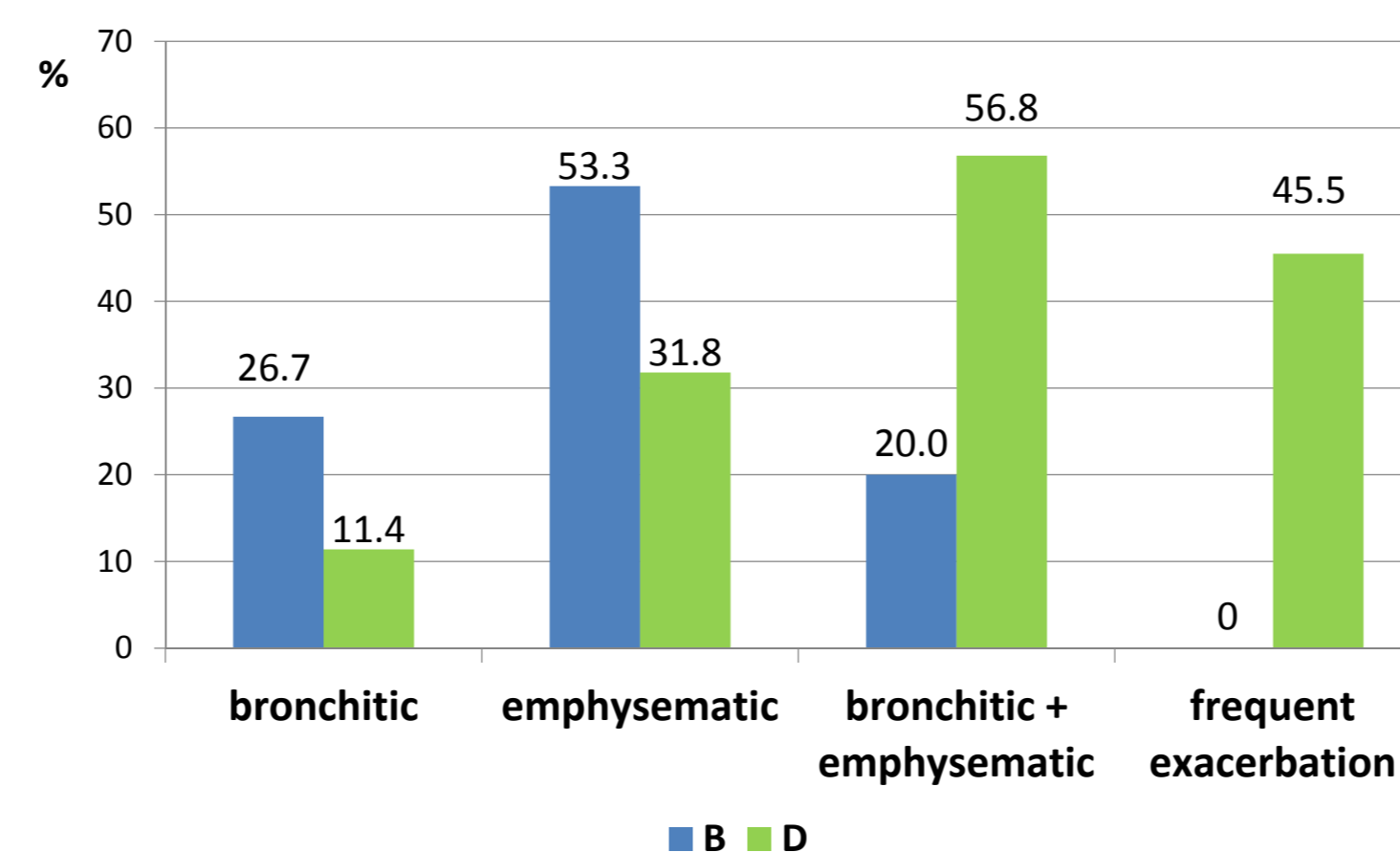Figure 3. The most frequent phenotypes (in percentage) in COPD patients with B and D category

Table 1. Differences in evaluated parameters in patients with B and D category

Parameters	B category (n=15, 63.8 ± 11.4 years)	D category (n=44, 66.7 ± 6.1 years)
steps per day	6128 ± 3107	3550 ± 2633***
6MWD (%)	74.9 ± 23.2	62.9 ± 23.4
FEV_1 (%)	52.3 ± 7.7	37.4 ± 10.6***
FVC_{ex} (%)	79.2 ± 12.2	70.9 ± 13.3*
SGRQ – total score	35.3 ± 18.9	50.6 ± 15.3**
SGRQ – activity score	48.0 ± 23.0	67.0 ± 15.6***
SGRQ – symptom score	37.8 ± 21.4	45.6 ± 21.1
SGRQ – impact score	27.2 ± 18.5	42.6 ± 19.6**
CAT	12.8 ± 7.0	18.1 ± 6.7*
Zung depression scale	52.7 ± 8.1	50.7 ± 9.5

Notes: 6MWD – 6-minute walk distance, FEV_1 – post-bronchodilator value of forced expiratory volume in 1 s, FVC_{ex} – post-bronchodilator value of forced vital capacity, * p < 0.05; **p < 0.01, ***p < 0.001– statistically significant difference between patients with B and D category

There was not any significant difference in DPA according to the most frequent phenotypes, although we have confirmed significant differences in CAT, SGRQ and Zung self-rating depression scale (Table 2).

Table 2. Differences in evaluated parameters according to COPD phenotypes

Phenotype	Steps per day	CAT	SGRQ total score	SGRQ symptom score	SGRQ impact score	Zung depression scale
bronchitic	5044 ± 3306	13.3 ± 5.8	28.8 ± 14.9	32.9 ± 17.1	20.7 ± 13.7	44.5 ± 4.7
emphysematic	4567 ± 3446	12.7 ± 4.0	42.0 ± 15.5	30.9 ± 17.5	34.4 ± 20.8	47.9 ±10.8
bronchitic + emphysematic	4995 ± 4059	16.0 ± 8.2	42.6 ± 15.5	44.3 ± 20.4	34.3 ± 16.0	56.0 ± 9.8 ‡
frequent exacerbation	3740 ± 2154	20.8 ± 6.2 *, ††	54.7 ± 13.5 **	51.9 ± 21.5 †	48.9 ± 15.9 **	51.7 ± 7.6

Notes: * p < 0.05; **p < 0.01– statistically significant difference between patients with bronchitic and frequent exacerbation phenotype, † p < 0.05, †† p < 0.01 – statistically significant difference between patients with emphysematic and frequent exacerbation phenotype, ‡ p < 0.05 – statistically significant difference between patients with bronchitic and bronchitic+emphysematic phenotype

CONCLUSION

Although GOLD categories might predict the level of DPA in severe COPD patients, COPD phenotypes do not identify patients with low DPA. Therefore, it is important to assess DPA level individually and regularly in patients with severe COPD for planning targeted comprehensive treatment for increasing their DPA.

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