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REHAKLINIK ENNS

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Effects of pulmonary rehabilitation

Retrospective evaluation of pulmonary rehabilitation outcome parameters in 2,595 consecutive patients – a single center experience

Background

Pulmonary rehabilitation (PR) has become an essential part in the management of COPD and other chronic respiratory diseases, supported by growing evidence about its efficacy.

In extension of a former study[1] evaluating first year results, we now report on the assessment of pulmonary rehabilitation outcome parameters collected within 44 months at the “Rehaklinik Enns”, a PR center in close cooperation with a tertiary care university hospital.

Methods

Patients attended an individually tailored three-week in-patient PR program according to the 2013 ATS/ERS guidelines[2] between June 2015 and January 2019. Spirometry, a 6-minute walk test (6MWT) and a COPD assessment test (CAT) were performed at the beginning and the end of the program. Changes were compared to the validated minimal clinically important difference (MCID)[3,4,5]. Additionally, the smoking cessation rate and its association with outcome parameters were analyzed.

Results

Among 2,595 patients (mean age 61.9y, 42.9% female) the most frequent diagnosis was COPD (64.1%), followed by asthma (13.5%), lung cancer (5.9%) and pulmonary embolism (2.7%).

Table 1) Patient characteristics, n= 2595

Patient characteristics	
Female gender, n (%)	1.114 (42.9)
Age, mean (SD)	61.9 (10.9)
FEV1 in liter, mean (SD)	1.8 (0.9)
FEV1%pred., mean (SD)	59.3 (22.3)
Current smokers (%)	26.2
Main diagnoses	
COPD, n (%)	1.664 (64.1)
Asthma, n (%)	350 (13.5)
Lung cancer, n (%)	153 (5.9)
Pulmonary embolism, n (%)	70 (2.7)
Pneumonia, n (%)	57 (2.2)
Lung fibrosis, n (%)	33 (1.3)
Sarcoidosis, n (%)	23 (0.9)
Other, n (%)	245 (9.4)

An increase in 6MWT above the MCID of 30 meters was observed in 51.8% of all patients. Greater benefits were seen in younger patients.

Table 2) Increase in 6MWT

Demografics and diagnoses	Increase in 6MWT [m] [mean (+/- SD)]
Gender	
Female (n=1.012)	31.4 (65.0)
Male (n=1.354)	35.0 (63.6)
Age	
All (n=2.366)	33.5 (64.2)
< 40 y (n=76)	50.9 (60.1)
40-49 y (n=204)	43.4 (60.0)
50-59 y (n=674)	37.7 (68.5)
60-69 y (n=798)	34.8 (61.7)
70-79 y (n=542)	22.4 (63.3)
> 80 y (n=72)	15.9 (58.1)
Smoking status	
All (n=2.337)	33.4 (64.3)
Current smokers (n=602)	33.3 (67.9)
Never/former smokers (n=1.725)	33.5 (63.0)
Main diagnoses	
COPD I-IV (n=2.362)	33.4 (64.1)
COPD I (n=459)	33.2 (60.7)
COPD II (n=1.067)	37.9 (59.6)
COPD III (n=634)	25.7 (69.7)
COPD IV (n=202)	33.7 (74.2)
Asthma (n=323)	37.4 (57.3)
Lung cancer (n=1.521)	32.0 (59.7)
Lung fibrosis (n=31)	25.1 (72.9)
Sarcoidosis (n=22)	67.3 (60.7)
Pulmonary embolism (n=62)	56.5 (53.6)
Pneumonia (n=54)	45.8 (59.4)
Other (n=216)	40.3 (54.4)

Fig. 1) Increase in 6MWT [m] by age

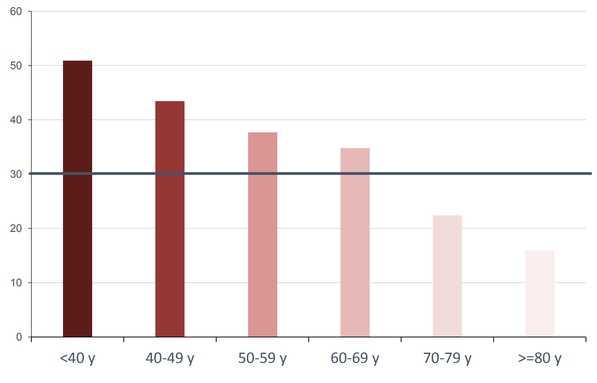
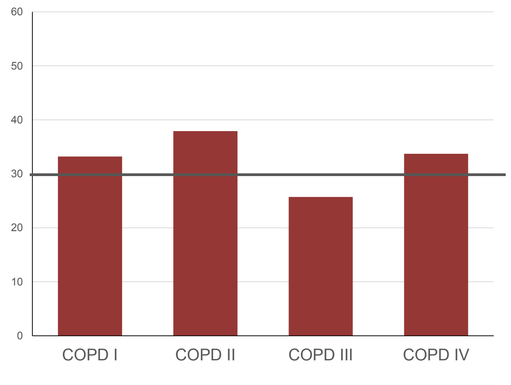


Fig. 2) Increase in 6MWT [m] by diagnosis

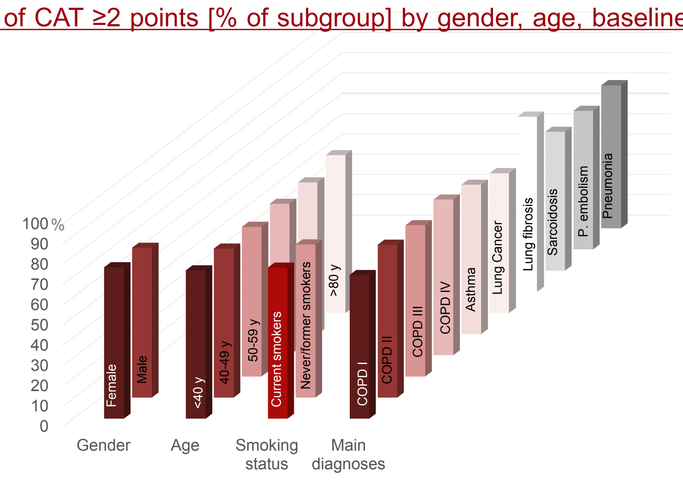


The mean reduction in CAT score was 5.4 points, a reduction in CAT score of at least the MCID of 2 points was evident in 74.4% of all patients. There were no differences for gender or baseline smoking status concerning 6MWT or CAT changes.

Table 3) Reduction of CAT ≥2 points (= MCID)

Demografics and diagnoses	CAT-reduction ≥2 points [n, (% of subgroup)]
Gender	
Female (n=1.005)	1011 (74.7%)
Male (n=1.354)	743 (73.9%)
Age	
< 40 y (n=71)	52 (73.2)
40-49 y (n=196)	144 (73.5)
50-59 y (n=665)	490 (73.7)
60-69 y (n=809)	604 (74.7)
70-79 y (n=546)	408 (74.7)
> 80 y (n=72)	56 (77.8)
Smoking status	
All (n=2.322)	1.729 (74.5)
Current smokers (n=611)	461 (75.5)
Never/former smokers (n=1.711)	1.268 (74.1)
Main Diagnoses	
COPD I (n=440)	312 (70.9)
COPD II (n=1.058)	797 (75.3)
COPD III (n=644)	480 (74.5)
COPD IV (n=210)	161 (76.7)
Asthma (n=288)	212 (73.6)
Lung cancer (n=141)	97 (68.8)
Lung fibrosis (n=29)	25 (86.2)
Sarcoidosis (n=19)	13 (68.4)
Pulmonary embolism (n=66)	45 (68.2)
Pneumonia (n=54)	38 (70.4)
Other (n=216)	160 (74.1)

Fig. 3) Reduction of CAT ≥2 points [% of subgroup] by gender, age, baseline smoking status and main diagnoses



Of a total of 639 current smokers, 166 (26.0%) stopped smoking at the end of PR, independent of age or gender. Successful cessation resulted in a greater increase in 6MWT (41.4m vs. 30.1m).

Fig. 4) Rate of current smokers and rate of successful smoking cessation after 3 weeks of PR

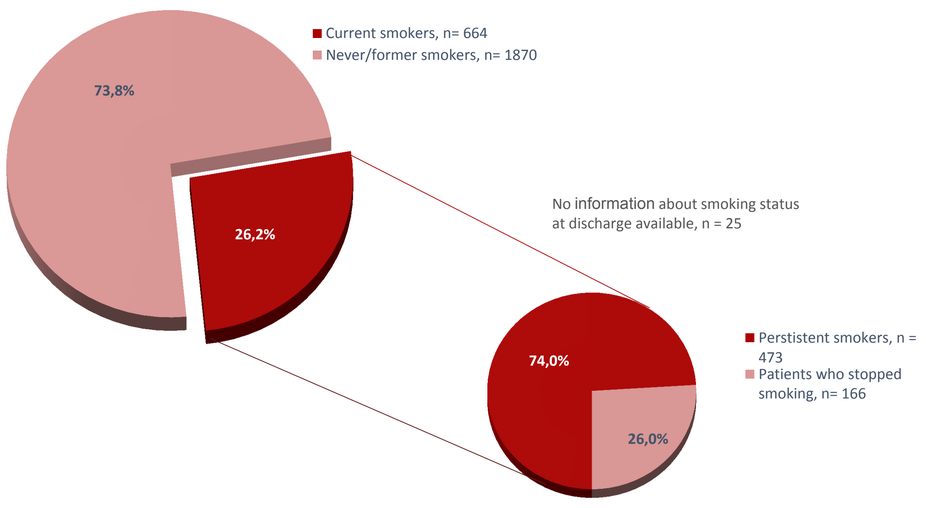
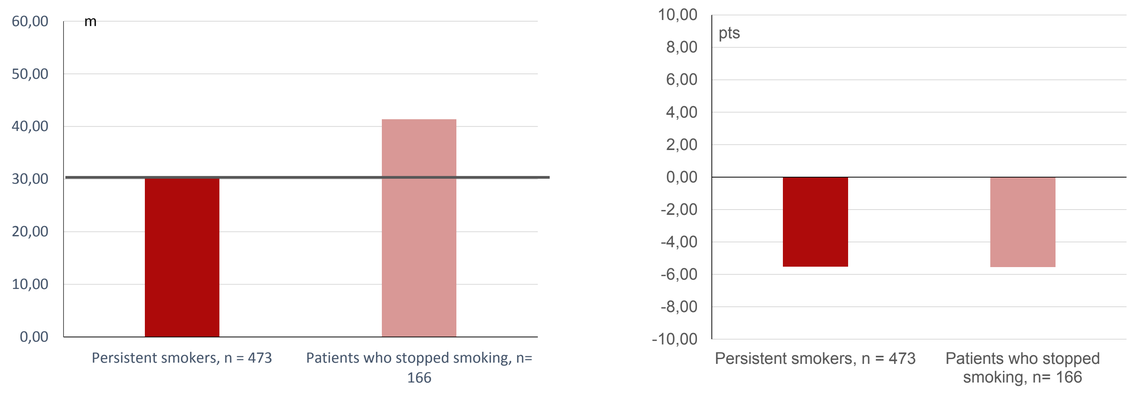


Fig. 5) Increase in 6MWT [m] and reduction of CAT [pts] by smoking status after 3 weeks of PR



Conclusion

PR showed beneficial effects irrespective of the entity and severity of pulmonary disease, sex and age. Patients who accomplished smoking cessation during PR had a greater 6MWT improvement than those who did not.

References:

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