



Cachexia in Chronic Obstructive Pulmonary Disease

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INTRODUCTION

The prevalence and mortality of chronic obstructive pulmonary disease (COPD) in elderly patients are increasing worldwide. Low body mass index (BMI) is a well-known prognostic factor for COPD. Cachexia and muscle wasting are well recognized as common and partly reversible features of COPD, adversely affecting disease progression and prognosis. Observational studies in COPD indicate that low BMI is associated with worse outcomes, and overweight/obesity has a protective effect - the so-called "obesity paradox". We aimed to determine the relationship between BMI and the rate of FEV₁ decline.

MATERIAL AND METHODS

The design is a cross-sectional study, including 220 patients with stable COPD as investigated group (IG), aged 40-75 years and 58 non-COPD subjects, matched by gender, age, body mass index (BMI), smoking-status, as control group (CG). All study subjects underwent pulmonary evaluation (dyspnea severity assessment, baseline and post-bronchodilator spirometry, gas analyses, chest X-ray, modified Medical Research Council dyspnea questionnaire). We analyzed BMI in 4 categories: BMI-I (< 18.5 or < 20 kg/m²), BMI-II (18.5 or 20 to < 25 kg/m²), BMI-III (25 to < 29 or < 30 kg/m²) and BMI-IV (≥29 or ≥ 30 kg/m²).

CONCLUSION

In mild to moderate COPD, higher BMI was associated with a less rapid decline of FEV₁ in male patients whereas this association was minimal in female patients. This gender-specific BMI effect was independent of COPD severity and smoking status. These novel findings support the obesity paradox in COPD: compared to normal BMI, low BMI is a risk factor for accelerated lung function decline, whilst high BMI has a protective effect. The relationship may be due to common but as-of-yet unknown causative factors. Further investigation into which may reveal novel endotypes or targets for therapeutic intervention.

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RESULTS

The analysis indicated incorrect distribution of frequencies for BMI (kg/m²) values for Shapiro-Wilk W=0.9746; p=0.00007, which is why appropriate non-parameter statistical tests were applied to the analyses. For p<0.05, no significant difference was established between the four IG subgroups in relation to the height of the BMI (Kruskal-Wallis H test: p=0.0291). Additional analysis in both groups indicated an average BMI of 25.4±3.8 kg/m² with a min/max of 17.6 /35.5 kg/m² in IG vs. 26.2±2.5 kg/m² with a min/max of 19.4 /33.2 kg/m² in CG. 50% of IG participants were less than 25.3kg/m² for Median IQR=25.3 (22.9-27.4), and in 50% of CG it was Median IQR=29.2. For p<0.05, the analysis indicated a significant association between the nutrition of subjects and the subgroup (GOLD 1→ GOLD 4) to which they belonged (Fisher Freeman Halton test: p=0.023). With decline of FEV₁, BMI also declined. Analysis between the two (IG/CG) groups indicated that, for p<0.05, there is a significant association between nutrition and the group to which the respondents belong (Pearson Chi-square test: X²=8,691; df=2; p=0.0129). CG respondents were 2,648 times more frequent obese compared to IG [OR=2.65 (1.37–5.13) 95% CI].

FIGURE 1 - Distribution of COPD patients according by degree of airflow limitation

Groups/ Subgroups	Gender			1p
	Male	Female	Total	
GOLD 1	43 (75.44%)	14 (25.56%)	57 (2.91%)	X ² =0.358; df=3; p=0.9488
GOLD 2	47 (75.81%)	15 (24.19%)	62 (18.18%)	
GOLD 3	38 (73.01%)	14 (29.92%)	52 (23.64%)	
GOLD 4	35 (71.43%)	14 (28.57%)	49 (22.27%)	
IG	163 (74.09%)	57 (25.91%)	220 (79.14%)	X ² =0.272; df=1; p=0.6021
CG	41 (70.69%)	17 (29.31%)	58 (20.86%)	

IG = Investigated Group; CG = Control Group; 1Pearson Chi-square test; *significance p < 0.05

FIGURE 2 - Distribuiotn of COPD patients by smoking status

Groups/ Subgroups	Smoking Status			1p
	Former smoker	Current smoker	Total	
IG - subgroups				
GOLD 1	19 (33.33%)	38 (66.67%)	57 (25.91%)	X ² =2,642; df=3; p=0.4501
GOLD 2	21 (33.87%)	41 (66.13%)	62 (18.18%)	
GOLD 3	20 (38.46%)	32 (61.54%)	52 (23.64%)	
GOLD 4	23 (46.94%)	26 (53.06%)	49 (22.27%)	
Groups				
IG	83 (37.73%)	137 (62.27%)	220 (79.14%)	X ² =0.558; df=1; p=0.4549
CG	25 (43.10%)	33 (56.90%)	58 (20.86%)	

IG=Investigated Group; CG=Control Group; 1Pearson Chi-square; *significant for p<0.05