THE IMPACT OF BACTERIAL INFECTIONS ON THE COURSE OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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Relevance

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of morbidity and mortality worldwide, particularly among older adults and individuals with a history of smoking. Characterized by persistent respiratory symptoms and airflow limitation, COPD is a progressive condition encompassing a range of pathophysiological changes, including chronic bronchitis, emphysema, and small airway disease. According to the Global Burden of Disease study, COPD ranks third among the leading causes of death globally, with exacerbations significantly contributing to disease progression and healthcare costs.

Objective

The objective of this study was to investigate the prevalence of bacterial infections in patients with COPD compared to a control group of healthy individuals.

Materials and Methods

This study was conducted between 2020 and 2023 and included a total of 250 participants, of whom 140 were diagnosed with COPD. The COPD patients were recruited from the Khorezm branch of RSCEMA, with diagnoses confirmed according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines, based on clinical symptoms and pulmonary function test results. The control group consisted of age- and sex-matched individuals with no known pulmonary or systemic diseases.

Sputum samples were collected from all participants, including spontaneous sputum from COPD patients and induced sputum from the control group. For bacterial identification, cultures were performed on blood agar, chocolate agar, and MacConkey agar. The plates were incubated at 37°C in a 5% CO2 atmosphere for 24–48 hours. Standard microbiological techniques, including Gram staining, catalase, and oxidase tests, were used to identify bacterial species.

Results

Table 1 presents a comparative analysis of bacterial infections between COPD patients and the control group, highlighting the prevalence of various bacteria in each group.

Table 1. Prevalence of Bacterial Infections in COPD Patients and the Control Group

Bacterial Infections	COPD Patients	Control Group	p-value
Haemophilus influenzae	75 (53.6%)	10 (9.1%)	p<0.0001
Streptococcus pneumoniae	46 (32.9%)	15 (13.6%)	p<0.001
Moraxella catarrhalis	28 (20.0%)	8 (7.3%)	p<0.01
Pseudomonas aeruginosa	15 (10.7%)	2 (1.8%)	p<0.01
Haemophilus parainfluenzae	25 (17.9%)	3 (2.7%)	p<0.0001
Staphylococcus aureus	18 (12.9%)	6 (5.5%)	p>0.05
Klebsiella pneumoniae	12 (8.6%)	4 (3.6%)	p>0.05
Escherichia coli	9 (6.4%)	5 (4.5%)	p>0.05
Enterobacter spp.	7 (5.0%)	3 (2.7%)	p>0.05
Mycoplasma pneumoniae	5 (3.6%)	3 (2.7%)	p>0.05
No bacterial infection identified	18 (12.9%)	69(62.7%)	p<0.001
Note: A p-value < 0.05 was considered statistically significant.			

CONCLUSION

This study demonstrates that bacterial infections, particularly those caused by *Haemophilus influenzae, Streptococcus pneumoniae, Moraxella catarrhalis, Haemophilus parainfluenzae, and Pseudomonas aeruginosa,* are significantly more prevalent in COPD patients compared to healthy individuals.

The data suggest that bacterial colonization exacerbates lung function deterioration and contributes to disease progression in COPD patients. Additionally, the significantly higher proportion of patients without bacterial infections, particularly among those with better-preserved lung function, underscores the importance of early intervention to prevent exacerbations.

These findings emphasize the need for targeted therapeutic interventions aimed at reducing bacterial infections and controlling inflammation to improve clinical outcomes in COPD patients. Future research should focus on developing strategies to

mitigate the effects of bacterial colonization and inflammation in the management of COPD.