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A STUDY OF THE PREVALENCE OF PULMONARY FUNGAL COLONIZATION IN ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

General Medicine

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ABSTRACT

Introduction: Chronic obstructive Pulmonary Disease (COPD) is a common preventable and treatable disease. Exacerbations are frequent events in the natural history of the disease. The rate of fungal infection in COPD has shown an upward tendency in recent times. Also, it brings a serious threat to these patients. **Aim:** To study the prevalence of pulmonary fungal colonization and to identify any association between fungal colonization with clinical manifestations in acute exacerbation of COPD. **Methodology:** Hospital based prospective, observational study was done from 1st July 2015 to 30th June 2016. Clinical data and fungal culture reports of patients with acute exacerbation of COPD were collected. **Results:** 103 patients were assessed. Mean age was 61.39±11.88 years. Males were 59.22%. Mean duration of disease was 63.34 months with 7.41 days of acute symptoms. Out of 103 patients, 64.08% were smokers, 41.75% had exposure history to indoor pollution and 8.74% had diabetes. Cases with history of inhaled steroids were 38.83%. Fungal growth in sputum was seen in 33.98%. Out of these, 77.14% were Candida albicans, 5.71% C glabrata, 2.86% C krusei and 2.86% C tropicalis. Fungal drug sensitivity reports showed resistance to Fluconazole was 37.14%, Itraconazole 2.86%, Voriconazole 2.86% and Amphotericin B 5.71%. In cases with fungal growth, mean duration of acute symptoms was 11.03 days compared to 5.54 days in cases without fungal growth ($p<0.001$). Severity according to GOLD criteria were mild (0%), moderate (34.29%), severe (51.43%), very severe (14.29%) in cases with fungal growth, and mild (7.35%), moderate (54.41%), severe (30.88%) and very severe (7.35%) in patients without fungal growth ($p<0.05$). **Conclusion:** The prevalence of fungal colonization in acute exacerbation of COPD was 33.98%. The duration of acute symptoms and severity of the disease were statistically significant in the patients with fungal growth in sputum. Hence fungal culture is recommended in all patients of COPD with acute exacerbations.

KEYWORDS

COPD, Fungal Colonization

INTRODUCTION:

Chronic obstructive pulmonary disease (COPD), a common preventable and treatable disease, is characterized by persistent airflow limitation which is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases.[1] According to the WHO estimates, currently 65 million people have moderate to severe COPD worldwide and more than 3 million people died of COPD in 2005.[2] Estimates show that COPD will rise from the fifth (in 2002) to the third leading cause of death worldwide in 2030.[2]

The overall severity of COPD is contributed by exacerbations and comorbidities in individual patients.[1] Exacerbations of COPD is an acute event characterized by a worsening of the patient's respiratory symptoms that is beyond normal day-to-day variations and leads to a change in medication.[1,3-5] There is approximately 10% in-hospital mortality for hypercapnic exacerbation with acidosis which increases to around 49% all-cause mortality in 3 years after hospitalization.[6-10] Its prevention, early detection and prompt treatment are vital to reduce the burden of COPD.[11]

There is evidence suggesting that some infectious agents, typically respiratory viruses and bacteria increase bronchial and systemic inflammation, which is commonly seen in acute exacerbations of COPD.[12,13] Other factors like air pollution, other allergens also trigger exacerbations. However in around one third of severe exacerbations of COPD, cause cannot be identified.[1]

Pulmonary fungal infections are common problems associated with chronic lung disease. In addition, because of the aging of population and the application of broad-spectrum antibiotics, immunosuppressants, glucocorticoids, invasive operations, the rate of fungal infection in COPD has an upward tendency and it brings a serious threat to the patients. Longer duration of treatment, cost, side effects and natural resistances to antifungal drugs etc. causes difficulties in treating these fungal infections. The key factor to cure lies in its early diagnosis and early treatment.[14]

AIMS AND OBJECTIVES:

(1) To study the prevalence of pulmonary fungal infection in acute exacerbation of COPD.
(2) To identify any association between presence of fungal infection with clinical manifestations and morbidity in acute exacerbation of COPD.

METARIALS AND METHODS:

It was a hospital based observational study, carried out in the department of Medicine, Assam Medical College and Hospital, Dibrugarh during the period from 1st July 2015 to 30th June 2016. Ethical clearance was taken from IEC (H).This study was funded by DBT Nodal Centre for Medical College and Biomedical Research Institute of North East India, Tezpur University, Assam.

Inclusion criteria: All cases of acute exacerbation of COPD, above 13 years, giving written informed consent.

Exclusion Criteria: Patients on anti-fungal drug within one month before, other respiratory diseases and co-morbidities, pregnancy etc.
A total of **103** patients of acute exacerbation of COPD were evaluated and sputum culture for fungal growth done in all the cases.

Limitations of the study: Small size, short duration of study and because of ethical considerations and lack of cooperation of the patients, only sputum analysis was done for detection of pulmonary pathogens.

RESULTS:

Mean age of patient with COPD was 61.4 + 11.9 years. The most common age group was found to be between 60-69 years (33.98%) followed by >70 years (30.10%).Both males and females were affected, but males outnumbered females with male: female ratio of 1.45 : 1. All the patients had dyspnoea and cough, 30.10% had wheezing, 24.27% had fever, 16.50% had symptoms of upper respiratory tract infection and 0.97% had chest pain.Out of 103 patients, 64.08% were smokers, 41.75% had history of exposure to biomass fuel and 1.94% had contact with occupational dust.In the present study, 38.83% patients were on inhalational steroids and 5.83% patients had history of intake of more than 2 courses of

antibiotics in the last 1 year.In the study, 7.77% patients were in underweight category.

The examination findings were anaemia in 9.71%, cyanosis in 39.81%, edema in 3.88%, hyperinflated chest in 63.11%, pursed lip breathing in 19.42%, use of accessory muscles of breathing in 58.25%, quiet breath sounds in 31.07%, rhonchi in 39.81% and crepitations in 53.40% patients.In the present study, most patients were of either moderate or severe category.

35 (33.98%) cases had growth of Candida species in sputum and the most common yield was *Candida albicans* in 27 (77.14%), followed by *Candida glabrata* in 2 (5.71%), *Candida krusei* and *Candida tropicalis* in 1 (2.86%) each and other *Candida species* in 4 (11.43%). Fluconazole resistance was found in **37.14%**, amphotericin B in 5.71%, itraconazole and voriconazole each in 2.86%.

Severity of COPD had significant association with fungal colonization ($p<0.05$).

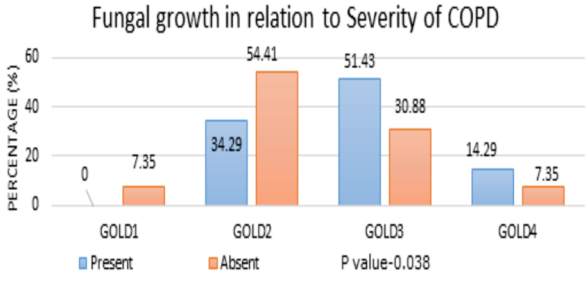

Fig 1: Percentage of Fungal Growth in relation to severity of COPD

Fig 2: Other Parameters in Relation to Fungal Growth:

Parameters	Fungal Colonization		P Value
	Present	Absent	
Acute Symptoms (in Days)	11.03 ± 7.56	5.54 ± 7.4	0.0006
Diabetes mellitus	4 (11.43)	5 (7.35)	0.485
Alcoholism	18 (51.43)	21 (30.88)	0.042
History of Taking Inhaled Steroids	19 (54.29)	21 (30.88)	0.021
>2 no of Similar Episodes (1 yr)	5 (14.29)	5 (7.35)	0.302
>2 no of Antibiotics Course (1 yr)	4 (11.43)	2 (2.94)	0.177
Hospital Stay >7 Days or Expired	18 (51.43)	12 (17.65)	0.0004

Previous Studies on Fungal Infection in Acute Exacerbation of COPD:

- Phukan AC*et al*[15](2000) in a study of bronchopulmonary candidiasis in Assam Medical College, Dibrugarh, Assam found 37.8% pulmonary candidiasis associated with chronic bronchitis cases. In the study, out of 6 different candida species,*Candida albicans* were most frequently (76%) isolated followed by *Candida tropicalis* (10%) and others.
- Biswas D *et al*[16](2010) in Himalayan region in India, found growth of fungus in 28 broncho alveolar lavage samples of 60 chronic respiratory disease patients, out of which, *Aspergillus flavus* was seen in 6, *Aspergillus funmigatus* in 4, *Aspergillus niger* in 3, *Candida albicans* in 12, *Candida tropicalis* in 2 , *Cryptococcus neoformans* in 1.
- ShiShaoMin*et al*[17](2011) in China found prevalence of fungal infection in patients with COPD in acute exacerbationwas 13.79%.
- Songsong Y *et al*[18](2016) in China, observed growths of candida in 33.82% cases out of acute exacerbation of COPD. *Candida albicans* (47.83%) was the most common species.

However, whether fungal colonization can serve as a marker of more severe lung disease, and whether aggressive therapy is needed, remained unknown from these studies. Thus, fungal colonization is an important part of acute exacerbation of COPD that is worthy of intense research.

CONCLUSION:

The prevalence of fungal colonization in acute exacerbation of COPD was **33.98%** in the study population. All the fungi isolated were yeasts and the most common species was *Candida albicans*. There is high prevalence of fluconazole resistance.

Inhaled steroids and alcoholism were definitive risk factors for fungal colonization. Diabetes mellitus, repeated use of antibiotics and repeated exacerbations were also associated with fungal growth. Duration and severity have also positive association with fungal colonization.

The results obtained are a good indicator showing correlation between fungal infection with clinical manifestations and morbidity in acute exacerbation of COPD. However, more studies with larger population and longer duration are required in order to conclude the same.

REFERENCES:

(1) Global initiative for chronic obstructive pulmonary disease. Global strategy for the diagnosis, management and prevention of chronic obstructive pulmonary disease. Updated 2015. No date [cited 2015 Jun 15]. Available from http://goldcopd.org/.
(2) World health organization. Chronic respiratory diseases. Burden of COPD. No date [cited 2015 Jun 15]. Available from: http://www.who.int/respiratory/copd/burden/en/
(3) Rodriguez-Roisin R. Toward a Consensus Definition for COPD Exacerbations. Chest. 2000;117(5):398S-401S.
(4) Burge S, Wedzicha JA. COPD exacerbations: definitions and classifications. European Respiratory Journal. 2003;21(Suppl 41):46S-53S.
(5) Celli BR, Barnes PJ. Exacerbations of chronic obstructive pulmonary disease. EurRespir J. 2007 Jun; 29(6):1224-38.
(6) Wouter EF. The burden of COPD in Netherlands: results from the Confronting COPD survey. Respir Med. 2003; 97 Suppl C:S51-S59.
(7) Connors AF, Dawson NV, Thomas C, Harrell F, Desbiens N, Fulkerson W et al. Outcomes following acute exacerbation of severe chronic obstructive lung disease. The SUPPORT investigators (Study to Understand Prognoses and Preferences for Outcomes and Risks of Treatments). Am J RespirCrit Care Med. 1996;154(4):959-967.
(8) Gunen H,Hacievliyagil SS, Kosar F, Mutlu LC, Gulbas G, Pehlivan E et al. Factors affecting survival of hospitalised patients with COPD. European Respiratory Journal. 2005;26(2):234-241.
(9) Kong GK, Belman MJ, Weingarten S. Reducing length of stay for patients hospitalized with exacerbation of COPD by using a practice guideline. Chest. 1997;111(1):89-94.
(10) Seneff MG, Wanger DP, Wanger RP, Zimmerman JE, Knaus WA. Hospital and 1-year survival of patients admitted to intensive care units with acute exacerbation of chronic obstructive pulmonary disease. JAMA. 1995;274(23):1852-7.
(11) Wilkinson TM, Donaldson GC, Hurst JR, Seemungal TA, Wedzicha JA. Early Therapy Improves Outcomes of Exacerbations of Chronic Obstructive Pulmonary Disease. Am J RespirCrit Care Med. 2004;169(12):1298-1303.
(12) Seemungal T, Harper-Owen R, Bhowmik A, Moric I, Sanderson G, Message S et al. Respiratory viruses, symptoms, and inflammatory markers in acute exacerbations and stable chronic obstructive pulmonary disease. Am J RespirCrit Care Med. 2001; 164(9):1618–23.
(13) Rosell A, Monsó E, Soler N, Torres F, Angrill J, Riise G et al. Microbiologic Determinants of Exacerbation in Chronic Obstructive Pulmonary Disease. Arch Intern Med. 2005;165(8):891.
(14) Clinical Analysis of Secondary Fungus Infection in Eighty Three Patients with Chronic Obstructive Pulmonary Disease in Acute Exacerbation. China Papers. 2010 May 31. No date [cited 2015 July15].Available from: http://mt.china-papers.com/2/?p=61149.
(15) *Phukan AC, Sarmabardoloi JN, Mahanta J.* **Bronchopulmonary candidiasis in a tertiary referral hospital of Assam India.***Ind J Med Sci. 2000;* **54:** *491-4.*
(16) Biswas D, Agarwal S, Sindhwani G, Rawat J. Fungal colonization in patients with chronic respiratory diseases from Himalayan region of India. Annals of Clinical Microbiology and Antimicrobials. 2010 Sep 20;9(1):28.
(17) ShiShaoMin. Clinical Analysis of Secondary Fungus Infection in Eighty Three Patients with Chronic Obstructive Pulmonary Disease in Acute Exacerbation - Master's thesis - Dissertation [Internet]. Dissertationtopic.net. 2008 [cited 26 September 2015]. Available from: http://www.dissertationtopic.net/doc/1438628.
(18) Songsong Y, Qiuhong F. Analysis of the Etiological Distribution and Drug Resistance of Pathogens in Hospitalized Patients with Acute Exacerbation of Chronic Obstructive Pulmonary Disease. Chest. 2016;149(4):A362.