Detection of Different Fungal Species in the Sputum of COPD Patients during Exacerbation

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Thesis

Submitted for partial fulfillment of the Master degree
In pulmonary medicine

By

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M.B, B. Ch., Ain Shams University **(**2016)

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2018

﴿وقُل رَّبِّ زِدْنِي عِلْماً﴾

سورة طـه الآيـــه رقم ١١٤

Acknowledgement

First of all, all gratitude is due to **God** *almighty for blessing this work, until it has reached its end, as a part of his generous help, throughout my life.*

Really I can hardly find the words to express my gratitude to **Prof. Dr. /Laila Ashour Helala** *Professor of Chest Diseases, faculty of medicine, Ain Shams University, for her supervision, continuous help, encouragement throughout this work and tremendous effort she has done in the meticulous revision of the whole work. It is a great honor to work under his guidance and supervision.*

I would like also to express my sincere appreciation and gratitude to **Prof. Dr. / Nevine Mohamed Mohamed AbdElfattah**, *Assistant Professor of Chest Diseases, faculty of medicine , Ain Shams University, for her continuous directions and support throughout the whole work.*

Really I can hardly find the words to express my gratitude to **Dr. /Mohamed Samer Abbas**, *Md in clinical pathology and tumor biomarkers-head manager of Abbasia Cheat Hospital Laboratories for his continuous directions and meticulous revision throughout the whole work. I really appreciate their patience and support.*

Last but not least, I dedicate this work to my husband, whom without their sincere emotional support, pushing me forward this work would not have ever been completed.

Contents

List of Abbreviations

COPD	:	Chronic obstructive pulmonary disease.
ABPA	:	Allergic bronchopulmonary aspergillosis
AIDS	:	Auto immune diseases
ARDS	:	Acute respiratory distress.
BAL	:	Broncho alveolar lavage
BHI	:	Brain-heart infusion
BLVR	:	Bronchoscopic Lung Volume Reduction
BMT	:	Bone marrow transplantation
CAT	:	COPD assessment test.
CDC	:	Centers for Disease Control and Prevention
CGB	:	Canavanine-glycine-bromothymol blue
CNS	:	Central nervous system
CT	:	Computed Tomography.
CXR	:	Chest X ray.
DH	:	Dynamic hyperinflation.
DLCO	:	Diffusing capacity of the lung for carbon monoxide.
ED	:	Emergency department.
EGFR	:	Epidermal growth factor receptor
ELISA	:	Enzyme-linked immunosorbent assay
ESR	:	Erythrocyte sedimentation rate
F	:	Frequency.
FEV	:	Forced expiratory volume.
FRC	:	Functional residual capacity.
FVC	:	Forced vital capacity.
GOLD	:	The Global Initiative for Chronic Obstructive Lung Disease.
HB	:	Hemoglobin amount
HRCT	:	High resolution Computed tomography
HRCT	:	High resolution Computed tomography.
I-E	:	Inspiratory-expiratory.
IC	:	Inspiratory capacity.

List of Abbreviations (Cont.)

ICU	:	Intensive care unit.
IGE	:	Serum immunoglobulin E
IPA	:	Invasive pulmonary aspergillosis
LVRS	:	Lung Volume Reduction Surgery
MHz	:	Megahertz.
mMRC	:	Modified Medical Research Council.
MRI	:	Magnetic resonant imaging.
SCC	:	Sabouraud with chloramphenicol and cycloheximide
NIV	:	Non-invasive ventilation
PCR	:	Polymerase chain reaction
PLT	:	Platelet count
PMNs	:	Polymorph nuclear neutrophils
RBS	:	Random blood sugar
RV	:	Residual volume.
Sao_2	:	Oxygen saturation.
SC	:	Sabouraud with chloramphenicol
SD	:	Standard deviation.
SGOT	:	Serum glutamic oxaloacetic transaminase
SGPT	:	Serum glutamic-pyruvic transaminase
Th	:	t helper cells
TLC	:	Total leukocytic count
TLC	:	Total lung capacity.
U	:	Urea
V/Q	:	Ventilation/perfusion.
VT	:	Tidal volume.

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Introduction

The goals of the Global Initiative for Chronic Obstructive Lung Disease **(**GOLD) are defined Chronic Obstructive Pulmonary Disease **(**COPD) as a preventable and treatable disease with some significant extra pulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gas [(1)].

The inflammation in the respiratory tract of COPD patients appears to be an amplification of the normal inflammatory response of the respiratory tract to chronic irritants. That is characterized by a specific pattern of inflammation involving neutrophils, macrophages, and lymphocytes1 [(2)]. These cells release inflammatory mediators that interact with structural cells in the airways and lung parenchyma causes structural changes and narrowing of the small airways, Destruction of the lung parenchyma leads to loss of alveolar attachments to the small airways and decreases lung elastic recoil; in turn, these changes diminish the ability of the airways to remain open during expiration [(3)].

Exacerbations represent a further amplification of the inflammatory response in the airways of COPD patients, and may be triggered by infection with bacteria or viruses or fungus or by environmental pollutants. In mild and moderate exacerbations there is an increase in neutrophils and in some studies also eosinophils in sputum and the airway wall, during an exacerbation there is increased hyperinflation and air trapping, with reduced expiratory

flow, thus accounting for the increased dyspnea. There is also worsening of VA/Q abnormalities resulting in severe hypoxemia [4].

Chronic obstructive pulmonary disease **(**COPD) is the fourth most common cause of death in the world, The WHO reported in 2010 that 3 million people died of COPD at 2005. That represents 5 percent of all deaths worldwide Ninety percent of those deaths take place in low or middle-income regions [5].

In Egypt, COPD is a rising significant health problem; however, information on its prevalence, morbidity, and mortality is still lacking. but CDC ' Centers for Disease Control and Prevention recently published that Chronic Obstructive Pulmonary Disease represent 4% of death in Egypt [6].

Fungal lung infections are frequently encountered by pulmonary and critical care practitioners. The increased prevalence of fungal lung infections with opportunistic pathogen like "Candida spp. causing candidiasis, Aspergillus spp. causing aspergillosis, Mucor spp. causing mucormycosis, Cryptococcus neoformans causing cryptococcosis " is largely related to increased numbers of immune-compromised and susceptible patients[7]. A number of factors may be associated with an increasing incidence of pulmonary fungal infection in COPD patients. Impaired T-lymphocyte function due to high-dose steroid therapy [8]. The use of broad-spectrum antibiotics may change normal flora, especially overgrowth of Candida species in the GI tract, which may translocate into the blood stream [9].

Hyper alimentation and invasive devices, including central vascular catheter, urinary catheter, and chest tube,

may also contribute to the development of fungal infection [10].

In the course of clinical practice 4 different clinical patterns in COPD patients. The first one is asymptomatic colonization [11]. The second presentation is chronic pulmonary aspergillosis that has an indolent progressive course that lasts for years [12], the third presentation, and an aspergilloma, is a conglomeration within bullae of hyphal matter, fibrin and cellular debris. Finally, patients with COPD with an exacerbation of their disease, can develop invasive aspergillosis with an almost 100% mortality rate [13].

Aim of Work

The purpose of the present study is detection of different fungal species cultured from sputum of COPD patients during acute exacerbation.

Chapter (1)

Chronic Obstructive Pulmonary Disease (COPD)

Chronic Obstructive Pulmonary Disease (COPD), a common preventable and treatable disease, is characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and comorbidities contribute to the overall severity in individual patients. The chronic airflow limitation characteristic of COPD is caused by a mixture of small airways disease (obstructive bronchiolitis) and parenchymal destruction (emphysema), the relative contributions of which vary from person to person .Chronic inflammation causes structural changes and narrowing of the small airways. Destruction of the lung parenchyma, also by inflammatory processes, leads to the loss of alveolar attachments to the small airways and decreases lung elastic recoil; in turn, these changes diminish the ability of the airways to remain open during expiration[(5)].

COPD is one of the most important causes of death in most countries. The Global Burden of Disease Study projected that COPD, which ranked sixth as a cause of