

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

Thesis

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Contents

Acknowledgment	
List of Abbreviations	i
List of Tables	ii
List of Figures	iii
 Introduction	 1
Aim of the work	4
Review of Literature	
Chapter 1: chronic obstructive pulmonary disease (COPD).....	5
Chapter 2: Epidemiology of Pulmonary Mycosis . .	23
Chapter3: Diagnosis of Pulmonary Fungal Infections	44
Chapter 4: Fungal Infection In COPD Patients.....	61
 Subjects and Methods..	 72
Results	77
Discussion	102
Summary	112
Conclusion	115
Recommendations	116
References	117
Arabic Summary	--

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.

List of tables

<i>Table</i>	<i>Title</i>	<i>Page</i>
1	Classification of COPD according to postbronchodilator FEV1.	20
2	Degree of breathlessness related to activities.	22
3	Aspergillus-associated respiratory disorders	37
4	Risk factors for invasive fungal infections in the critically ill patients	40
5	European Organization of the Research and Treatment of Cancer/Mycoses Study Group criteria for diagnosis of invasive fungal infection	41
6	Tests used for the direct and indirect diagnosis of pulmonary mycoses	51
7	Reagents and stains for the mycological examination of different clinical sample	53
8	Culture media recommended for fungal isolation according to clinical specimen and fungal growth period	55
9	The clinical characteristics of the enrolled cases	77
10	the Clinical data of the enrolled cases	78
11	The X-ray findings of the enrolled cases	79
12	Laboratory findings and the arterial blood gases parameters of the studied COPD cases	80
13	The percentage of different fungal species among the studied patients	81
14	Comparison between the two groups {positive and negative fungal cultures} as regards clinical characteristics and chest X-ray findings	83

List of tables (Cont.)

<i>Table</i>	<i>Title</i>	<i>Page</i>
15	Comparison between the two groups {positive and negative fungal cultures} as regards laboratory findings and arterial blood gases parameters	85
16	Comparison between the different results of the fungal cultures in this study as regards clinical characteristics and X-ray findings	87
17	Comparison between the different results of fungal cultures as regards laboratory findings and arterial blood gases parameters	92
18	Calculation the cut off value of number of exacerbations per year and length of stay in the last hospital admission and its value in predicting fungal infection among the studied patients	98
19	The diagnostic characteristics of optimum cut off points for the number of exacerbations per year & the length of stay in the last hospital admission and the use of corticosteroids in between attacks in predicting a positive results of fungal culture	100

List of Figures

<i>Fig.</i>	<i>Title</i>	<i>Page</i>
1	Combined classification of COPD.	21
2	Sabouraud's dextrose agar	76
3	Ingredients of Sabouraud's Dextrose Agar.	76
4	Candida albicans on Sabouraud's Dextrose Agar	76
5	Candida albicans on Sabouraud's Dextrose Agar	76
6	Different types of Aspergillus species cultured on Sabouraud's dextrose agar	76
7	Microsporum canis cultured on Sabouraud's dextrose agar	76
8	The percentage of different fungal species among the studied patients	82
9	Comparison between the different results of fungal culture in this study as regards the number of exacerbation in the last year	88
10	Comparison between the different results of fungal culture in this study as regards the length of stay in the last hospital admission	89
11	Comparison between the different results of fungal culture in this study as regards the use of corticosteroids in between attacks of exacerbations	90
12	the percentage of different grades of dyspnea in relation to the different results of fungal culture among COPD patients in this study	91

List of Figures (Cont.)

<i>Fig.</i>	<i>Title</i>	<i>Page</i>
13	Comparison between the different results of fungal culture in relation to So2 level of the blood as a parameter of arterial blood gases	94
14	Comparison between the different results of fungal culture in relation to the PH value of the blood as a parameter of arterial blood gases	95
15	Comparison between the different results of fungal culture in relation to the level of serum creatinine	96
16	Comparison between the different results of fungal culture in relation to the ESR level	97
17	Calculation the cut off value of number of exacerbations per year and length of stay in the last hospital admission and its value in predicting fungal infection among the studied patients	99

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 lymphocytes ⁽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