شبكة المعلومات الجامعية

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بسم الله الرحمن الرحيم

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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Value of Adding Nebulized Magnesium Sulphate to Rescue Medications in Acute Exacerbation of Chronic Obstructive Pulmonary Disease in Patients Admitted to Emergency Room

Thesis

Submitted For partial fulfilment of master degree in chest diseases

By

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بسم الله الرحمن الرحيم

فَتَعَالَى اللَّهُ الْمَلِكُ الْحَقُّ
وَلَا تَعْجَلْ بِالْقُرْآنِ مِنْ قَبْلِ
أَنْ يُقْضَى إِلَيْكَ وَحْيُهُ
وَقُلْ رَبِّ زِدْنِي عِلْمًا

سورة طه
الآية ١١٤

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Ahmad Mohamad Farag Shehata

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LIST OF ABBREVIATIONS

AECOPD	Acute exacerbations of chronic obstructive pulmonary disease
ASAH	Aneurysmal subarachnoid hemorrhage
ATP	Adenosine triphosphate
BMI	Body mass index
CC16	Club cell protein-16
CF	Cystic fibrosis
CNS	Central nervous system
COPD	Chronic obstructive pulmonary disease
COPDSS	Chronic obstructive pulmonary disease severity scale
CRP	C-reactive protein
DALYS	Disability-adjusted life years
EBC	Exhaled breath condensate
ED	Emergency department
FEV1	Forced expiratory volume in 1^{st} second
FVC	Forced vital capacity
IB	Ipratropium bromide
ICS	Inhalation corticosteroids
ICU	Intensive care unit
IL-8	Serum interleukin 8
LABA	Long-Acting Beta Agonist
LAMA	Long-acting muscarinic receptor antagonist
MG	Magnesium
NMDA	N-methyl-d-aspartate
PA	Pseudomonas aeruginosa
PAO2	Partial arterial oxygen pressure
PCR	polymerase chain reaction
PM	Particulate matter
PMN	Polymorphonuclear neutrophils
PPIS	Proton pump inhibitors
QOL	Quality of life
SABA	Short-acting inhaled B2 agonist
TBI	Traumatic brain injuries
TDP	Torsade de pointes
TNF-A	Tumor necrosis factor-alpha

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INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases. **(GOLD, 2021)**

Chronic Obstructive Pulmonary Disease (COPD) exacerbation is a sustained acute/subacute worsening of the severity or frequency of symptoms such as dyspnea, cough or sputum production, with increased quality of life impairment, lasting at least 3 days, which prompts the patient to seek medical attention or leads to a change in medication. **(Guimaraes et al., 2016)**

Chronic Obstructive Pulmonary Disease (COPD) exacerbations play a central role in the natural history of the disease, affecting its overall severity, decreasing pulmonary function, worsening underlying co-morbidities, impairing quality of life (QoL) and leading to severe morbidity and mortality**. (GOLD, 2021)**

Chronic Obstructive Pulmonary Disease (COPD) is associated with evidence of systemic oxidative stress, activation of circulating inflammatory cells and increased plasma level of proinflammatory cytokines which include C-reactive protein. **(Murali et al., 2012)**

Spirometry is essential to assessing airflow obstruction and COPD diagnosis. The results of this measurement play a fundamental role in scales and classifications of the disease, making it essential to patient characterization. **(Lopez et al., 2013)**

A single exacerbation can lead to a significant rate of decrease in lung function in patients with moderate to severe COPD. **(Jenny, 2012).** Short-acting inhaled B2 agonists (SABAs) and short-acting muscarinic

antagonists (SAMAs) remain the mainstay in the treatment of symptoms and airflow obstruction during COPD exacerbations. **(Qureshi et al., 2014)**

A number of factors have been documented to be associated with severity and exacerbation of the disease, an important one being serum magnesium levels. Hypomagnesaemia is a common finding in acute exacerbation of COPD and is frequently encountered in patients who present late to the hospital. **(Subhankar et al., 2018)**

Magnesium has a key role in numerous physiological processes. Important underlying mechanisms of action of magnesium include calcium antagonism via calcium channels, regulation of energy transfer (such as the production and function of ATP) and membrane stabilization. **(Herroeder et al., 2011)**

In the airways, magnesium is a bronchodilator through various mechanisms including an inhibitory effect on bronchial smooth muscle contraction mediated by calcium and an inhibitory effect on acetylcholine release from cholinergic nerve terminals and histamine from mast cells. **(Edwards et al., 2013)**

Fewer studies have addressed the effects of magnesium in chronic obstructive pulmonary disease (COPD) even though asthma and COPD share some pathophysiological characteristics (such as bronchial hyper-responsiveness) as well as numerous therapies, particularly bronchodilator treatments. **(Nouira et al., 2012)**

Nebulized magnesium is attractive as a therapeutic option because it is easily administered, relatively cheap and has minimal side effects. In light of some evidence for an effect when nebulized in severe exacerbations of asthma, the similarities between asthma and chronic obstructive pulmonary disease (COPD) (especially with regard to bronchodilator therapy) and the practical advantages of administration via

nebuliser, we sought to focus on the nebulized route of delivery in acute exacerbations of chronic obstructive pulmonary disease (AECOPD). **(Edwards et al., 2013)**

AIM OF THE WORK

This work aims to evaluate the effect of administration of nebulized magnesium sulphate in the management of acute exacerbations of chronic obstructive pulmonary disease.

CHAPTER (I)

Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) is a disease which is characterized by airway inflammation and progressive airflow limitation with poor reversibility. Patients with COPD can experience periods of acute deterioration, which are called exacerbations. There are different definitions for an acute exacerbation of COPD (AECOPD). A symptom reported AECOPD is defined solely based on a patient's symptoms. This is regardless of whether the patient seeks medical attention or receives treatment for the exacerbation. An event defined AECOPD requires a therapeutic intervention such as a change in COPD medications or a change in healthcare utilization **(Zinellu et al., 2021)**.

Generally accepted is the definition as "an event in the natural course of the disease characterized by a change in the patient's baseline dyspnoea, cough, and/or sputum that is beyond normal day-to-day variations, is acute in onset and may warrant a change in regular medication in a patient with COPD". Frequent exacerbations can result in a decreased health related quality of life, a decline in lung function, an increased risk of hospitalization and an increase in mortality. It is estimated that COPD is the 4th leading cause of death worldwide and will be the 3rd leading cause of death in 2030. Along with increasing mortality rates, the loss in disability-adjusted life years (DALYs) also rises (**Eapen et al., 2017)**.