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# **Correlation between Central Venous pressure and Inferior Vena Cava Diameter for Fluid assessment in patients with Chronic Obstructive Pulmonary Disease**

*Thesis*

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا  
إلا ما علمتنا إنك أنت  
العليم العظيم

صدق الله العظيم

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# *List of Abbreviations*

Abb.	Full term
ANCA .....	Anti-neutrophil cytoplasmic antibody
BMI.....	Body-mass index
BUN.....	Blood urea nitrogen
CI .....	Compressibility index
CO.....	Cardiac output
CO2.....	Carbon dioxide
COPD.....	Chronic obstructive pulmonary disease
CPFE .....	Combined pulmonary fibrosis and emphysema
CTR.....	Cardiothoracic ratio
CVP.....	Central venous pressure
CXR .....	Chest x-ray
EABV.....	Effective arterial blood volume
FEV1.....	Forced expiratory volume
FVC.....	Forced vital capacity
FVD .....	Femoral vein diameter
GD.....	Graves' Disease
GOLD .....	Global Initiative for Chronic Obstructive Lung Disease
HR.....	Heart rate
HS .....	Highly significant
IBM SPSS.....	Statistical Package for Social Science
ICS.....	Inhaled corticosteroids
IVC CI .....	Inferior vena cava collapsibility index
IVC.....	Inferior vena cava
IVC-CI .....	IVC collapsibility indices
LABA.....	Acting beta2-agonists
LAMA .....	Long-acting antimuscarinic agents
LVEF .....	Left ventricular ejection fraction
MABP .....	Mean arterial blood pressure

## *List of Abbreviations Cont...*

Abb.	Full term
NS .....	Non significant
PAOP .....	Pulmonary artery occlusion pressure
PCV13.....	13-valent pneumococcal conjugate vaccine
PDE .....	Phosphor diest erase
PDE4 .....	Phosphor diesterase-4
PLR.....	Passive leg-raising test
PPSV23.....	23-valent pneumococcal polysaccharide vaccine
PvCO2 .....	Pressure of carbon dioxide in venous blood
RAP.....	Right a trial pressure
RSV.....	Respiratory syncytial virus
S.....	Significant
SAMA .....	Short-acting anti muscarinic agents
TAPSE.....	Tricuspid annular plane systolic excursion
TEE.....	Trans esophageal echocardiography
TNF .....	Tumor necrosis factor
USG .....	Ultra sonography
V.....	Ventilation
VPW.....	Vascular pedicle width
VR.....	Venous return

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# INTRODUCTION

**C**hronic obstructive pulmonary disease (COPD) is now the third leading cause of death globally. (*Lozano et al., 2010*). Although COPD primarily affects the lungs, it is now also recognized as a complex multi-component disease characterized by chronic systemic inflammation that frequently coexists with other conditions known as comorbidities (*Divo et al., 2012*).

Patients with mild-to-moderate COPD, the Pulmonary artery: Aorta ratio is associated with RV hypertrophy, RV enlargement, and decreased RV function independent of systolic or diastolic left heart function. These changes to the PA seem to reflect primary pulmonary vascular changes and may be predictive of mild or early PH in COPD. (*Iyer et al., 2014*). Moreover; Decreased tricuspid annular plane systolic excursion, decreased tricuspid annular systolic velocity, and elevated tricuspid regurgitation velocity were associated with all-cause mortality. LV diastolic dysfunction is also present in COPD patients with normal or mildly increased pulmonary artery pressure (*Hilde et al., 2013*).

Accurate assessment of intravascular volume remains one of the most challenging and important tasks for clinicians. A protocol of early goal directed therapy was done, which included aggressive fluid resuscitation targeted to central venous pressure and physiological variables, reduced organ

failure and improved survival in patients with critical illness (*Rivers et al., 2001*). However, more recent studies in critically ill patients have demonstrated that excessive fluid resuscitation and markedly positive net fluid balance is associated with higher rates of complications and increased mortality (*Vincent, 2006*).

Availability of an ultrasound device at the critical care setting significantly enhances possible diagnostic ways and makes the management of critically ill patients more effective. Growing amount of papers confirms that qualified intensivists with background in medicine and anaesthesiology may provide accurate, safe and extensive diagnosis of the haemodynamic system with the aid of Ultrasonography (*Balík, 2019*).

Interrogation of abdomen in sepsis of unknown origin, acute abdominal syndrome or in acute renal failure may direct further diagnostic and therapeutic steps in critically ill patient. Time factor is particularly important in shock and during admission of severe trauma where patient's survival depends on correctly launched diagnostic algorithm. Ultrasound plays a key role here (*Balík, 2019*).

## **AIM OF THE WORK**

**T**he objective of this study is to determine the correlation between central venous pressure (CVP) and the IVC collapsibility index for estimating the fluid status in COPD patients.

## Chapter 1

# CHRONIC OBSTRUCTIVE PULMONARY DISEASE

### Introduction:

Chronic obstructive pulmonary disease (COPD) is a common and treatable disease characterized by progressive airflow limitation and tissue destruction. It is associated with structural lung changes due to chronic inflammation from prolonged exposure to noxious particles or gases most commonly cigarette smoke. Chronic inflammation causes airway narrowing and decreased lung recoil. The disease often presents with symptoms of cough, dyspnea, and sputum production. Symptoms can range from being asymptomatic to respiratory failure (*Singh et al., 2019*).

### Etiology:

COPD is primarily present in smokers and those greater than age 40. Prevalence increases with age and it is currently the third most common cause of morbidity and mortality worldwide. In 2015, the prevalence of COPD was 174 million and there were approximately 3.2 million deaths due to COPD worldwide. However, the prevalence is likely to be underestimated due to the under diagnoses of COPD (*GBD 2015 Chronic Respiratory Disease Collaborators, 2015*).