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Prevalence and Presentation of Pulmonary Hypertension Among COPD Patients in Port Sudan Teaching Hospital

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Abstract
Background: Pulmonary hypertension is a critical medical problem that result in significant morbidity and mortality and it defined as mean pulmonary arterial pressure (mPAP >20 mmHg) at rest. Pulmonary hypertension classified into 5 groups these are: Pulmonary arterial hypertension, Pulmonary hypertension due to left heart disease, Pulmonary hypertension due to lung disease, Chronic thromboembolic pulmonary hypertension and Pulmonary hypertension with unclear or multifactorial causes. COPD is define as a heterogeneous lung condition characterized by chronic respiratory symptoms (dyspnea, cough, sputum production and/or exacerbation) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent and often progressive, airflow obstruction. COPD represent a major cause of pulmonary hypertension due to lung disease and both COPD and pulmonary hypertension are underestimated in the study area; therefore, this study aims to cover this area.
Objective: To assess the frequency and clinical presentation of pulmonary hypertension in patients with COPD.
Methods: A descriptive cross-sectional hospital-based study conducted in Port Sudan teaching hospital, Red Sea state, Sudan from January 2024 to April 2024, all patients diagnosed with COPDs attended the chest referral clinic were included in this study. Data collected through questionnaire, echocardiogram and spirometry study done for all patients and data analyzed using SPSS version 25.0.
Results: 48 patients who diagnosed with COPD are participate in this study,5 (10.41) have mild COPD, 14(29.17%) have moderate COPD, 26(54.17) have severe COPD 3 (6.25%) very severe COPD. the mean age of 52.2 ± 12.4 years, 32 males and 16 females with male: female ratio 2:1. 14 patients (29.2%) have pulmonary hypertension, 8 (57.14%) of them have mild pulmonary hypertension (mPAP 25 – 34 mmHg), 4(28.57%) have moderate (Mpap35- 44 mmHg) and just 2 (14.29%) have severe pulmonary hypertensions (mPAP >45mmHG), 16(33.3%) complicated with heart failure.
Conclusion: Our study concluded that the prevalence of pulmonary hypertension among patients with COPD in the study area is 29.2% which is significant and need more care through special pulmonary hypertension center and it shows that the develops of pulmonary hypertension in COPD didn't always compatible with the severity of COPD.

Keywords: Prevalence, Pulmonary Hypertension, COPD, Echocardiogram, Spirometry

1. Introduction

Chronic obstructive pulmonary disease (COPD) is heterogeneous lung condition characterized by chronic respiratory symptoms (dyspnea, cough, sputum production and/or exacerbation) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent and often progressive, airflow obstruction [1]. COPD is a leading and still-increasing cause of chronic morbidity and mortality worldwide [2] and according to the World Health Organization (WHO), it is the fifth most common cause of death [3].

Pulmonary arterial hypertension (PAH) is a chronic and progressive disease leading to right heart failure and ultimately death if untreated. Pulmonary hypertension is define as resting mean pulmonary artery pressure (m PAP) >20 mmHg and pulmonary capillary wedge pressure (PCWP) of ≤ 15 mmHg [4] this diagnosis confirmed by right heart catheterization but may be estimated using echocardiogram. Pulmonary hypertension (PH) due to chronic lung diseases or conditions with alveolar hypoxia is classified as Group III of WHO classification of PH [4]. The European Society of Cardiology and the European Respiratory Society (ESC-ERS) guidelines specify its role, essentially in the screening proposing criteria for estimating the presence of PH mainly based on tricuspid regurgitation peak velocity and systolic artery pressure (s PAP) (5). Studies agreed that the development of pulmonary hypertension (PH) in chronic obstructive pulmonary disease (COPD) has both functional and prognostic implication [6, 7]. And it is usually mild to moderate with preserved cardiac output, and evolves slowly alongside the progression of lung disease and hypoxemia [8]. However, a minority of patients develop severe PH with elevations in pulmonary artery pressure that have been described as "out of proportion" [9, 10].

Etiology of pulmonary hypertension in lung diseases including COPD is not fully understand but it includes high susceptibility to alveolar hypoxia and/or tobacco smoke [11, 12], destruction of the capillary vascular bed [13], inflammatory factors initiating remodeling of the pulmonary vascular bed [14, 15] or the coexistence of idiopathic pulmonary arterial hypertension (IPAH) in patients with lung disease [16].

Naeije *et al* addressed the pulmonary hypertension associated with COPD, they agreed that pulmonary hypertension is a common complication of chronic obstructive pulmonary disease (COPD). The increase in pulmonary artery pressures is often mild to moderate, but some patients may suffer from severe pulmonary hypertension, and present with a progressively clinical course because of right-sided heart failure additional effect. The cause of pulmonary hypertension in COPD is generally assumed to be hypoxic pulmonary vasoconstriction leading to permanent medial hypertrophy. However, recent pathological studies point to extensive remodeling of the pulmonary arterial walls, with prominent intimal changes. These aspects account for minimal reversibility with supplemental oxygen.

In Port Sudan- Eastern Sudan the prevalence of both COPD and pulmonary hypertension are increasing recently and COPD seem to be the second cause of pulmonary hypertension in this area after ILD; so this study done to address this relationship.

2. Methodology

Study design:

This is a descriptive cross sectional hospital based study.

Study area:

The study done in Port Sudan teaching hospital, chest referral clinic which is the main referral clinic in the state.

Study population:

All patients diagnosed with COPD attending the clinic during the study period and accepted to be enrolled in the study and those were 48 patients.

Study duration:

This study done from January 2024 to April 2024.

Data collection:

Data collected through structured questionnaire and interview, echocardiogram done for all patients and systolic pulmonary artery pressure (SPAP) estimated using TR velocity via Beroulli equation and also spirometry done for all patients. Data analyzed using SPSS version 25.0.

Inclusion criteria:

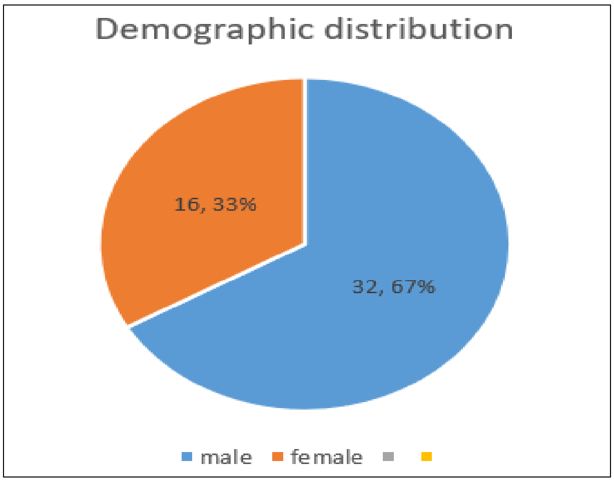
Adult patients who are diagnosed with COPD in base of symptoms and spirometry study.

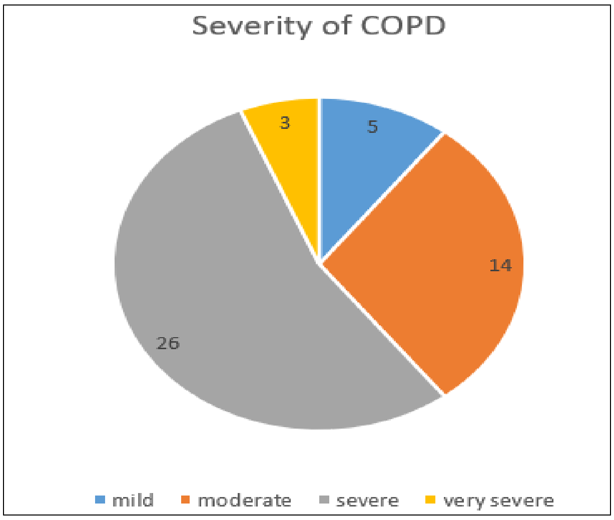
Exclusion criteria:

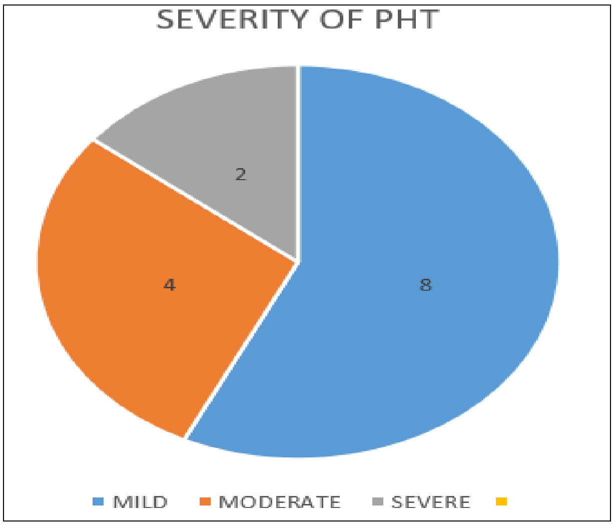
Patients who other risk of PHT

3. Result

48 patients who diagnosed with COPD are participate in this study,5 (10.41%) have mild COPD, 14(29.17%) have moderate COPD, 26(54.17) have severe COPD 3 (6.25%) very severe COPD. the mean age of 52.2 ± 12.4 years, 32 males and 16 females with male: female ratio 2:1. the main presenting symptoms were cough in 48 patients (100%), sputum production 43(89.58%) shortness of breath 42 (87.5%), fatigability 40 (83.3%) palpitation 34 (70.8%) lower limb swollen 16 (33.3%) and chest pain 22 (45.8%). The study showed that smokers were 38 (79.2%), 14 patients (29.2%) have pulmonary hypertension, 8 (57.14%) of them have mild pulmonary hypertension (SPAP 35 – 50 mmHg), 4(28.57%) have moderate (SPAP 51 - 70 mmHg) and just 2 (14.29%) have severe pulmonary hypertensions (SPAP >70mmHG), 16(33.3%) complicated with heart failure.







4. Discussion

Chronic obstructive pulmonary disease – related pulmonary hypertension is a serious complication of COPD but both COPD and pulmonary hypertension are underestimated in study area because of deficiency of diagnostic tools. Pulmonary hypertension diagnosed in this study through estimated SPAP using TR velocity vi Beroulli equation therefore this may be more or less accurate. The prevalence of pulmonary hypertension in chronic obstructive pulmonary disease (COPD- related pulmonary hypertension) is unknown worldwide but it may varies between 20- 91%, this wide range is due to participant of other factors as age, presentation of COPD and comorbidity [17] while in our study the prevalence is 29.2% and this actually less than reality because in this study we exclude any other risk of pulmonary hypertension and again for underestimation of COPD.

Many studies conclude that pulmonary hypertension in COPD usually mild to moderate and severe pulmonary hypertension in COPD varies between 1% to 4% [18, 19], in our study as global still pulmonary hypertension mild to moderate and rarely severe but the severe pulmonary hypertension shows high percentage comparing to other studies 14.29% in comparison to 1% to 4% but this is may be explained by small sample size in this study. As in all studies pulmonary hypertension occurs in male more than female 2:1 this follows the high prevalence of COPD in male and smoking may be other factor.

Although pulmonary hypertension in this study tend to be mild to moderate in severity, one third of patients developed heart failure which indicate that complications may take place regardless the severity.

5. Conclusion

This study covered 48 participants (patients diagnosed with COPD), just 14 (29.2%) developed pulmonary hypertension which is indicate that other factors such as age, comorbidity, underline cause of COPD, duration and presentation of COPD contribute in development of pulmonary hypertension.

The prevalence of pulmonary hypertension among COPD patients is highly significant and despite it tend to be mild to moderate, it need more attention and special care.

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