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Study of Frequency of Occurrence of Cor-Pulmonale Among COPD Patients

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Abstract:
Abstract: Aim: To study the frequency of occurrence of cor-pulmonale among COPD patients. Methods: This was a single centre case control cross-sectional observational study design including 50 cases and 50 controls. COPD patients more than 40 years of age, having acute exacerbation and presenting to SS Hospital, Varanasi were included in the study after screening. Proper history and physical examination was done and CBC, LFT, RFT, ABG, hsCRP, Spirometry, ECG, ECHO was performed and data was collected and recorded for analysis. Results: 38 % (n=19 out of 50) of patients with COPD developed pulmonary hypertension class 3 i.e. secondary to chronic lung diseases leading to dilated Right Atrium and Right Ventricle (cor-pulmonale). Conclusion: This study showed that the frequency of cor-pulmonale among COPD patient was 38%.

Keywords: Chronic obstructive pulmonary disease, hsCRP= high sensitivity C-reactive protein, Right Atrium and Right Ventricle, cor-pulmonale

Introduction:

The notion of a right-sided phenotype of heart failure in patients with chronic lung diseases is not new. In 1963, a World Health Organization-sponsored expert consensus conference reviewed chronic lung diseases-associated PH as a cause of heart failure, and defined “cor pulmonale” as RV hypertrophy and dilatation resulting from diseases affecting the structure or function of the lungs [(1)]. This morphological definition proved impractical, and cor pulmonale became better understood as altered RV structure and function with eventual right heart failure symptomatology caused by PH on a background of pulmonary disease, most commonly COPD [(2–4)]. It is interesting that echocardiographic signs of cor pulmonale may be found in patients with COPD and minimally increased PAP, suggesting that factors other than only PH alter RV-PA coupling in COPD [(5)]. Pulmonary hypertension (PH) as a complication of COPD is generally mild to moderate but can be severe in some patients [(6)]. Mean pulmonary artery pressures (mPAP) higher than 35–40 mm Hg have been reported in 1–5% of patients with advanced COPD [(7–9)]. PH has long been known to be associated with a reduced life expectancy in COPD, in proportion to increased PAP [(10)].

Aim: To study the frequency of occurrence of cor-pulmonale among COPD patients.

Methods: Approval of the ethical committee was obtained in May 2017. This study was done from June 2017 to April 2019. COPD patients more than 40 years of age, having acute exacerbation and presenting to SS Hospital were screened and those meeting the inclusion and exclusion criteria were selected for the study.

Table 1: Inclusion criteria:

COPD patients with:	
	Post Bronchodilator FEV_1/FVC <70%
	Post-bronchodilator reversibility <200ml and < 12%
	Indian population
	Aged >40years.

Table 2: Exclusion Criteria:

Domiciliary oxygen therapy
Hypertension
Diabetes mellitus
Inflammatory diseases
Hemodynamically unstable patients
Coagulopathies
Renal diseases
Liver diseases
Malignancies
Long term steroids use
Anticoagulant and antiplatelet medication use
Drug abuse
Alcoholics
Active smokers
Pregnancy

Control group: Adult aged >40 years among indian population and hemodynamically stable.

Study Design: A single center case control cross-sectional observational study design including 50 cases and 50 controls (healthy volunteers) was done.

Data Analysis: Data was analyzed using Trial version of SPSS 20 utilizing ANOVA, Student t-test, chi-square, Mann-Whitney test.

Table 3: Base line characteristic of controls (healthy volunteers) and cases (COPD patients) .

Variables	**GroupI (control)**	**Group II (cases)**	**P-value**
Age in years	60.68±7.78	60.82±8.68	0.933
Sex			

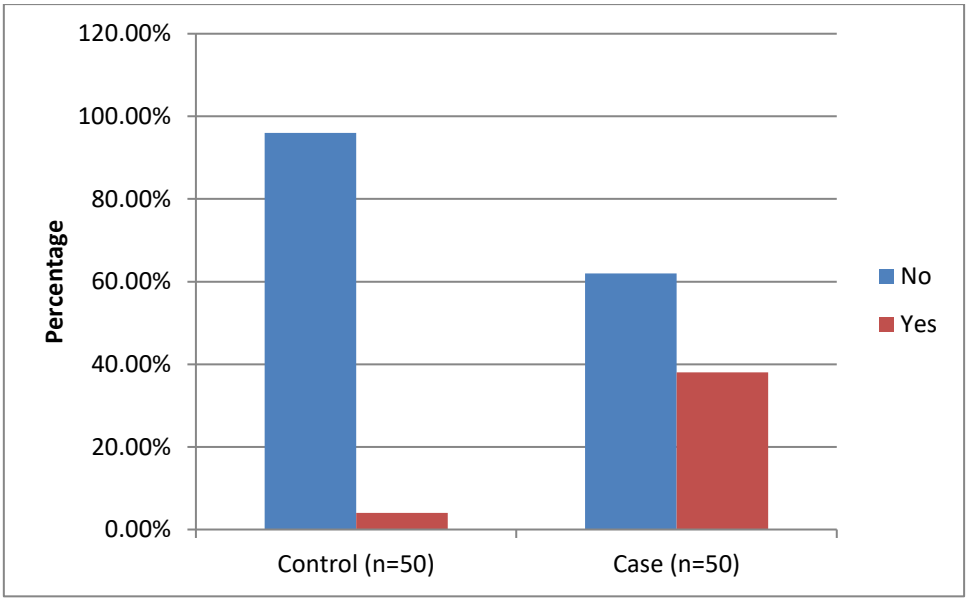
Male **Female**	46.0% (n=23) 54.0% (n=27)	36.0% (n=18) 64.0% (n=32)	0.309 0.309
BMI in kg/m2 **<18.5** **18.5-24.9** **25-29.9** **>30**	 14.0% (n=7) 80.0% (n=40) 6.0% (n=3) 0.0% (n=0)	 2.0% (n=1) 80.0% (n=40) 16.0% (n=8) 2.0% (n=1)	 0.051
FEVI/FVC **<70%** **>70%**	 0.0% (n=0) 100.0% (n=50)	 100.0% (n=50) 0.0% (n=0)	
FEV1 **>80%(GOLD 1)** **>50-80%(GOLD 2)** **>30-50%(GOLD 3)** **<30% (GOLD 4)**	 100.0% (n=100) 0.0% (n=0) 0.0% (n=0) 0.0% (n=0)	 0.0% (n=0) 32.0% (n=16) 46.0% (n=23) 22.0% (n=11)	 0.000
mMRC grading **0** **1** **2** **3** **4**	 84.0% (n=42) 12.0% (n=6) 4.0% (n=2) 0.0% (n=0) 0.0% (n=0)	 0.0% (n=0) 0.0% (n=0) 14.0% (n=7) 30.0% (n=15) 56.0% (n=28)	 0.000
CAT Score **0-40**	1.52±1.86	25.84±6.58	0.000

Observation:

Table 4: Cor-pulmonale

Cor-pulmonale	**Control (n=50)**		**Case (n=50)**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**
No	48	96.0%	31	62.0%	79	79.0%
Yes	2	4.0%	19	38.0%	21	21.0%
Total	50	100.0%	50	100.0%	100	100.0%

$\chi 2=17.420$, p=0.000



Conclusion:

Above table clearly showed that 38 % (n=19 out of 50) of patients with COPD developed pulmonary hypertension class 3 i.e. secondary to chronic lung diseases leading to dilated Right Atrium and Right Ventricle (cor-pulmonale). The diagnosis of PH is based on echocardiographic mostly, electrocardiography and clinical finding in our study. Though, Right Heart catheterization is the gold standard for diagnosis of pulmonary hypertension, we utilized non-invasive criteria like clinical parameters, ECG and Echocardiography mostly.

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