ORIGINAL RESEARCH PAPER

Medicine

KEY WORDS:

ASSESSMENT OF LEFT VENTRICULAR DIASTOLIC DYSFUNCTION IN ELDERLY PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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INTRODUCTION:

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 increased chronic inflammatory response in the airways and the lung to noxious particles or gases[14]. Exacerbations and co-morbidities contribute to the overall severity in individual patients Worldwide, the most common risk factor for COPD is tobacco smoking. In many countries, outdoor, occupational, and indoor air pollution – the latter resulting from the burning of biomass fuels – are also major COPD risk factors.

A clinical diagnosis of COPD should be suspected in any patient with breathlessness, chronic cough or sputum production, and a history of exposure to risk factors for the disease. Spirometry is useful in making the diagnosis in this clinical context[9].

Classification of Severity of Airflow obstruction in COPD (Based on GLOBAL INTIATIVE FOR CHRONIC LUNG DISEASE (GOLD) CRITERIA[9]:
In patients with FEV1/FVC < 0.70:
GOLD 1: Mild FEV1 ≥ 80% predicted
GOLD 2: Moderate 50% ≤ FEV1 < 80% predicted
GOLD 3: Severe 30% ≤ FEV1 < 50% predicted
GOLD 4: Very Severe FEV1 < 30% predicted

Cardiovascular disease accounts for almost 50% of all hospitalization and nearly one third of all deaths, if f FEV1< 50% of predicted. In more advanced disease cardiovascular disease account for 20%–25% of all deaths in COPD[3]. COPD affects pulmonary blood vessels, right ventricle, as well as left ventricle and leads to development of pulmonary artery hypertension, cor pulmonale, right ventricular dysfunction, and left ventricular dysfunction too.

Left ventricular diastolic dysfunction(LVDD) is an another frequent condition in COPD patients[1]. Inflammation is considered to be one of the systemic manifestations of COPD and provides an explanation for the relationship between airflow limitation and cardiovascular risk. However, the prevalence of LVDD in COPD patients according to inflammatory markers and disease severity has not yet been established in COPD patients. Given the prognostic implications of cardiovascular disease in COPD, its detection could serve as a guide to appropriate treatment and eventually improve survival.

The mechanisms that might explain the presence of left ventricular diastolic dysfunction in COPD patients are many. First is chronic hypoxemia leading to intracellular calcium transport disturbances which might result in abnormalities of myocardial relaxation. This mechanism usually occurs in severe cases of COPD, grade III and IV. Second is the presence of pulmonary hypertension with chronic right ventricular hypertrophy which may develop in COPD patients followed by right ventricle dilatation.

During early diastole, the ventricular septum displaces toward the left ventricular cavity and the left ventricle becomes distorted from its circular configuration. The severity of left ventricular and septal deformity depends on the transseptal pressure gradient. Thirdly, the presence of emphysema and hyperinflation which has been related to impaired left ventricle filling. This is due to increased intrathoracic pressures which may impair cardiac function by decreasing biventricular preload and increasing left ventricular after load. The fourth cause is the inflammation which is considered to be one of the systemic manifestations of COPD .The systemic inflammation can be evaluated by measuring C-reactive protein(CRP),matrix metallopeptidase (MMP-9), tissue inhibitor of mettaloprotienases(TIMP-1) and MMP-9/TIMP-1[8]. There was a tendency towards higher MMP-9and CRP levels with higher GOLD-stage. Indeed there were lower levels of TIMP-1 and the ratio of MMP-9/TIMP-1 with higher gold stage. There was a statistically highly significant difference of inflammatory markers between COPD grades and with increasing severity of disease]. MMP-9 has been implicated in human emphysema, with its principal effect being the destruction of the extracellular matrix, particularly elastin. The protease: antiprotease hypothesis has dominated thinking regarding the pathogenesis of emphysema. CRP is the well-studied biomarker of systemic inflammation in COPD.

MATERIALS AND METHODS

This study was conducted at rural tertiary care , after obtaining clearance from the hospital ethical committee. All patients of age >/=to 60yrs(taken as elderly) who admitted to medical ward with diagnosis of COPD satisfying inclusion criteria were selected over a period of 18months.ths study was carried out on 60 consecutive patients who presented to our tertiary care centre with COPD during period from 2016 to 2018.

In all the selected patients with established diagnosis of COPD detailed history was taken , a complete general physical examination with detailed respiratory examination was carried out . Along with routine blood investigations pulmonary function tests and GOLD criteria, chest radiogram, electrocardiography (ECG),echocardiogram(2DECHO) , arterial blood gas (ABG) analysis were done .

INCLUSION CRITERIA

Elderly (>/=60 years) patients with COPD attended to Medicine OPD ,admitted in our tertiary care centre.

EXCLUSION CRITERIA

Patients with primary involvement of left side of the heart.
Patients with valvular or myocardial disease
Patients with arterial occlusive disease from emboli
Patients with primary pulmonary hypertension
Patients with congential heart disease.

OBSERVATION AND RESULTS:

TABLE 1: LEFT VENTRICULAR DIASTOLIC DYSFUNCTION (LVDD) IN COPD PATIENTS :

LVDD	NUMBER	PERCENTAGE
NO	50	83.3
YES	10	16.7
TOTAL	60	100.0

Piediagram 1: Shows Echocardiologicl Estimation Of Leftv entricular Diastolic Dysfunction And Was Present In 16.7% Cases.

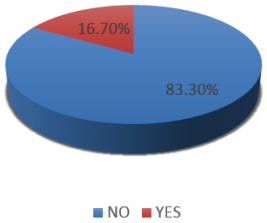
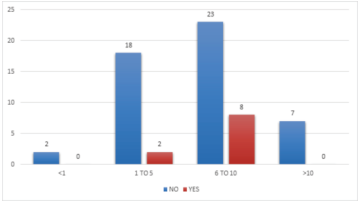


Table 2: Relation Of Past History Of Copd To Development Of Left Ventricular Diastolic Dysfunction:

			LVDD		TOTAL
			NO	YES	
PASTH/O COPD	<1	COUNT	2	0	2
		%	100.0%	0.0%	100.0%
	1 TO 5	COUNT	18	2	20
		%	90.0%	10.0%	100.0%
	6 TO 10	COUNT	23	8	31
		%	74.2%	25.8%	100.0%
	>10	COUNT	7	0	7
		%	100.0%	0.0%	100.0%
TOTAL		COUNT	50	10	60
		%	83.3%	16.7%	100.0%



GRAPH 2: SHOWS THAT MAJORITY (25.8%) LVDD FOUND IN PATIENTS WITH COPD FOR 6TO 10 YEARS.

DISCUSSION:

Cardiovascular disease is a frequent cause of mortality in COPD. Roughly 30% of copd patients die from cardiovascular disease[2].

In the present study group it was observed that 10(16.7%) of total patients had left ventricular diastolic dysfunction majority are male .

In study done by **N.k.Guptha, R.K.Agarwal ET** al[13] 19(47.5%) patients has left ventricular diastolic dysfunction.

STUDY	PERCENTAGE OF PATIENTS WITH LVDD
N.K.GUPTHA et al(TOTAL=40)13	47.5%(19)
ALOK AGARWAL et al(TOTAL=50)28	78%(39)
ABEER M RAWY et al(TOTAL=49)11	73.5%(36)
G.C.FUNK et al(TOTAL=50)1	84%(42)
PRESENT STUDY(TOTAL=60)	16.7%(10)

In study done by **Abeer M. Rawy**[11] echocardiological evaluation of left ventricular diastolic dysfunction was done according to severity of COPD . GOLD stage 1 ,2,3,4 left ventricular diastolic dysfunction was found in 0%,72%,100%,100% respectively.

There are many mechanisms which can explain the left ventriclular diastolic dysfunction in COPD as observed in **Abeer M Rawy**[11] the possible mechanism might be chronic hypoxemia leading to intracellular calcium transport disturbances which might result in abnormal myocardial relaxation.

According to **K.Jorgensen et al**[2] another mechanism which contributes to left ventriclular diastolic dysfunction is presence of emphysema and hyperinflation which leads to increased intrathoracic pressure which may impair cardiac function by decreasing biventricular preload and increasing left ventricular after load.

According to **G.Lourriads et al**[11] in presence of pulmonary hypertension with chronic right ventricular hypertrophy which may develop in copd patients followed by right ventricular dilatation.

In study done by **Ying sun et al.,** 65.5 % Patients were having left ventricular diastolic dysfunction but they have not taken the severity into criteria and they have not associated LVDD with severity of COPD as the study population includes patients more than 65 years of age who may already have left ventricular diastolic dysfunction.

In present study duration of COPD has been taken in to consideration and related to development of left ventricular diastolic dysfunction and observed that 10% patients with copd for 1to 5 years and 25.8% patients with COPD for 6-10 years were having left ventricular diastolic dysfunction.

LIMITATIONS OF THE STUDY:

The present study has few limitations as the sample size was small (60 patients).

The study was only hospital based.

CONCLUSION:

In conclusion, the patients admitted with COPD must undergo detailed cardiac status evaluation which includes pulmonary artery hypertension, corpulmonale, and left ventricular dysfunction.

As observed in the study, with progression of duration of COPD leftventricular diastolic dysfunction is more .

Early detection and treatment of LVDD in COPD patients may improve quality of life .

Echo-cardiography which is used as a tool for detecting LVDD in present study is very cost effective and non invasive can be used as a routine diagnostic test for assessing cardiac function in COPD patients.

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