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A CROSS-SECTIONAL RESEARCH TO ASSESS THE LVDD (LEFT VENTRICULAR DIASTOLIC DYSFUNCTION) IN COPD (CHRONIC OBSTRUCTIVE PULMONARY DISEASE) PATIENTS

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Abstract:
Objective: *Association amongst COPD and cardiovascular diseases intensely persist because diastolic dysfunction is generally diagnosed in patients with COPD's problem. The purpose of the conduct of the study is to decide about the existence of left ventricular diastolic dysfunction in patients of COPD.*
Material and Methods: *Relative study had conducted for a period of one year at Allied Hospital, Faisalabad (February to October 2017). In the study, the inclusion of confirmed 50 COPD's patients was sort. Patients were examined for pulmonary function tests, ECG, clinical positive signs and chest X-Ray (PA view) alongside taking the history of smoking. Additionally, patients were verified for left ventricular diastolic dysfunctions and get them through echocardiography.*
Outcomes: the *Standard ratio of FEV1/FVC was (56.9 ± 14.3) percent and Patient's mean age was (60.7 ± 6.2) years. In the same way, typically turned out of patient's ejection fraction was (60.6 ± 4.6). The mean peak velocity for the patient's mitral filling was (69.8 ± 15.9) cm/s. The mean peak filling rate of the patients mitral was (57.2 ± 30.9) cm/s and the standard ratio of E/A was (1.3 ± 0.3). The patient's iso-volumetric relaxation time range was (84.2 ± 14.7) m sec, standard mitral E deceleration time was (187.4 ± 25.1) m sec and the standard range of atrial flow reversal was (0.28 ± 0.04). Fourteen patients (28%) out of 50 were having LV diastolic dysfunction.*
Conclusion: *LV diastolic dysfunction incidence was present in COPD patients and it has an association with an increased pulmonary artery pressure.*
Keywords: *Left Ventricular Diastolic Dysfunction (LVDD), Chronic Obstructive Pulmonary Disease (COPD) and Echocardiography.*

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INTRODUCTION:

Lung tissue destruction and fibrosis categorized the chronic obstructive pulmonary disease (COPD), causing into reduced elasticity [1]. A number of times it describes chronic or continuing cough, shallow breathing on exertion or even elusive pains in the chest or unambiguous radiological results on chest x-ray defined as bronchitis, fibronodular or reticulonodular variations [2]. In the world, the fifth leading cause of death in COPD [3]. About 7% sickness absence from work in the UK is due to this disease [4, 5]. The major causes for it are instigated to alpha-antitrypsin deficiency, tobacco smoke or initiated by professional and environmental reasons [6].

COPD is having no symptom in initial phases, conversely, after teenage, about 25 to 30 mL forced expiratory volume in one second (FEV_1) decreased in non-smokers per year, as compared to smokers, in whom an average decline is (45 to 60) mL. About twenty percent smokers had an augmented deterioration in FEV_1 every annum up to (150 to 200) mL. The FEV_1 declination is directly proportional to tobacco smoke. In the range of the 50% affected smokers, (15 to 20) percent develop substantial disease [7]. At the diagnosis time, the majority of patients lose their lung capacity up to 50%. The COPD exists resilient affiliation to cardiovascular diseases [9]. The declination in the rate of FEV1 is directly associated with cardiovascular mortality [10]. In COPD patients, failure of the function of the heart is generally reported [11]. In a current study, 54 out of 109, patients found to be affected by HF with an FEV1 (< 70%) in unspoiled systolic function. With no left ventricular systolic dysfunction, the presence of heart failure results into diastolic dysfunction [13]. The rate of diastolic dysfunction (ventricular filling) is diminished as the ventricular walls coagulated, and the duration of ventricular filling shortens by tachycardia [14].

COPD has common symptoms and signs as of heart failure such as dyspnea, rales, tachycardia and oedema [15]. The increases diagnostic accuracy is achieved with the help of ECG and chest X-rays [16]. In COPD, the high ratio of dysfunction of the left ventricle (LV) is due to common risk elements through heart disease like cigarettes smoking, age and male gender [17]. With the progression of the disease, it gets involve both Left ventricle (LV) and right ventricle (RV), and they're corresponding systolic and diastolic functions. For the assessment of dysfunction of LV, it is required to carry out a routine echocardiography [18]. At present in Pakistan, data is lacking on association among chronic obstructive pulmonary disease and left ventricular diastolic dysfunction. As a result of this study, bases in early diagnosis and management would be established. Moreover, the quality of life would be developed and these patient's functional status would be improving.

MATERIAL AND METHODS:

This cross-sectional study completed at Allied Hospital, Faisalabad (February to October 2017). Subsequent to appropriate approval of the study, through non-probability purposive sampling procedure, 50 patients selected from the indoor department. A pre-informed written consent from the patients was acquired before induction in to this study. Both the gender factor and age ranging from 40-80 years, presented for registration in to this study. Included the patients in to the study who were having less than 10 years of smoking history, chest tightness and productive cough lasting for less than 3 months with regular indications of dyspnea, and wheezing. Moreover, those patients who were also possessing clinical signs of barrel-shaped chest, bronchi and coarse crepitation vesicular breathing with extended expiration, nicotine staining, FEV1/FVC more than 70%, positive chest radiography findings and FEV1 more than 60% estimated were included in the study. The only omission was those patients who were already diagnosed cases of failure of heart on the clinical sign's basis of chest X-Ray, ECG, paroxysmal nocturnal dyspnea rales and orthopnea. The patients were undergoing observation for positive clinical signs and they were examined for pulmonary function tests, x-ray chest PA view (cardiothoracic ratio), ECG and afterwards get through echocardiography and their LV diastolic dysfunctions recorded. Through stratification, confounders were controlled.

SPSS used for statistical analysis in this study. Quantitative variables were limits like age, smoking history, ejection fraction, ratio of FEV1, FVC, FEV1/FVC, inner diameter of LV in systole and diastole, peak mitral filling rate (A), peak mitral filling velocity (E), isovolumetric relaxation time (IVRT), E/A ratio, mitral deceleration time, and atrial flow reversal and presented as fix and standard deviation. Qualitative variables like gender and LV dysfunction were presented as percentages and frequency.

RESULTS:

All under study patient's average age was (60.7 ± 6.2) years. Out of 50 patients in the study, 90% (45) were male whereas 10% (5) were female. Smoking history was of 86% (43) patients and 26% (13) patients with occupational smoking history. The patient's normal FEV1 value was (45.7 ± 13.1) percent with (20 – 60) range and FVC was (78.6 ± 7.8) percent ranging from (60 to 90). The average ratio of FEV1/FVC was (56.9 ± 14.3) ranging from (30 to 70).

In systole normal inside diameter of left ventricular was (29.2 ± 2.1) and (46.5 ± 3.4) in diastole. Normal ejection fraction of the patients was (60.6 ± 4.6) ranging from (50 to 70). The maximum mitral filling velocity (E) of the patient was (69.8 ± 15.9) ranging from (50 to 100) and maximum mitral filling rate (A) was (57.2 ± 30.9) ranging from (40 to 90) while the normal ratio of E/A was (1.3 ± 0.3). Standard IVRT was (84.2 ± 14.7) minutes and (187.4 ± 25.1) m sec was the regular time of mitral deceleration. The average reversal atrial flow was (0.28 ± 0.04). The LVDD patients were 28% (14), whereas, 72% (36) had a satisfactory ventricular function.

Table – I: Gender Versus Smoking Stratification

Gender / Smoking		Number	Percentage
Gender	Male	45	90
	Female	5	100
Smoking	History	43	86
	Occupational	13	26

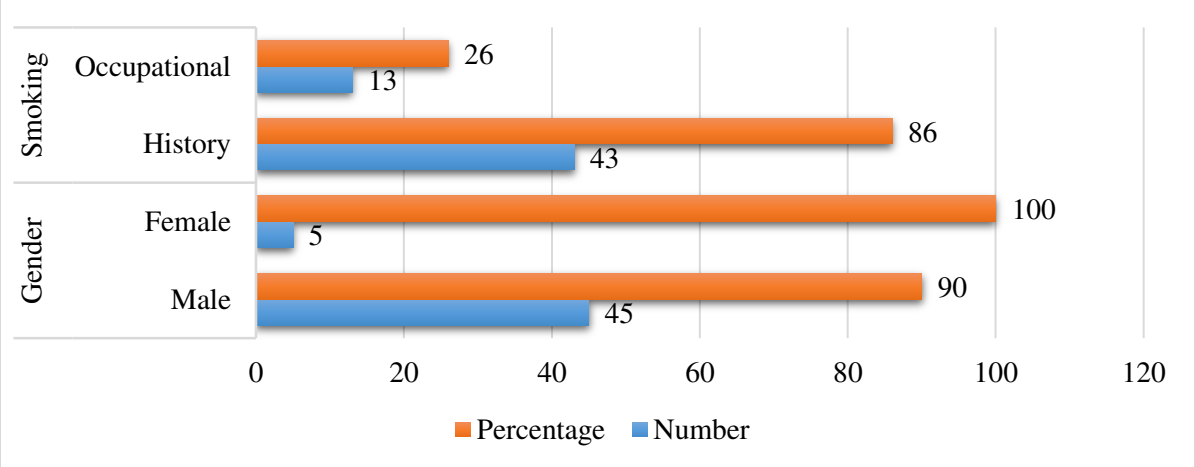


Table – II: Patient's Characteristics

Variable	Value	± Tolerance
Age	60.7	6.2
FEV – I	45.7	13.1
FVC	78.6	7.8
FEV – I / FVC	56.9	14.3

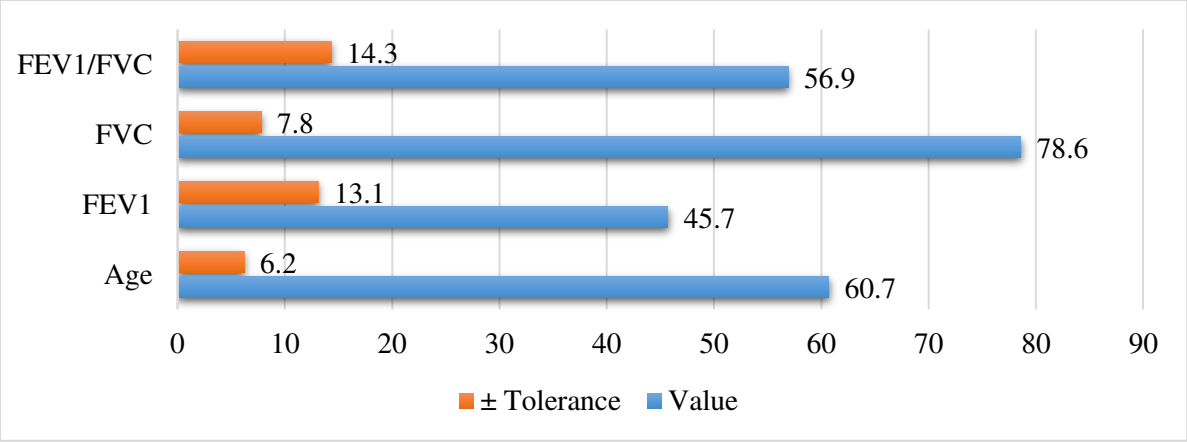


Table – III: Echocardiographic Outcomes

Echocardiographic Findings	Number/ Value	Percent/ ± Tolerance
Left ventricular internal diameter in systole	29.2	2.1
Left ventricular internal diameter in Diastole	46.5	3.4
Ejection Fraction	60.6	4.6
Peak Mitral Filling Velocity "E"	69.8	15.9
Peak Mitral Filling Rate "A"	57.2	30.9
E/A Ratio	1.3	0.3
E/A Ratio ≤ 1	8	16
E/A Ratio 1 – 2	40	80
E/A Ratio > 2	2	4
Mean IVRT	84.2	14.7
IVT (70 – 90)	41	82
IVRT > 90	9	18
Mitral Deceleration Time	187.4	25.1
Atrial Flow Reversal	0.28	0.04

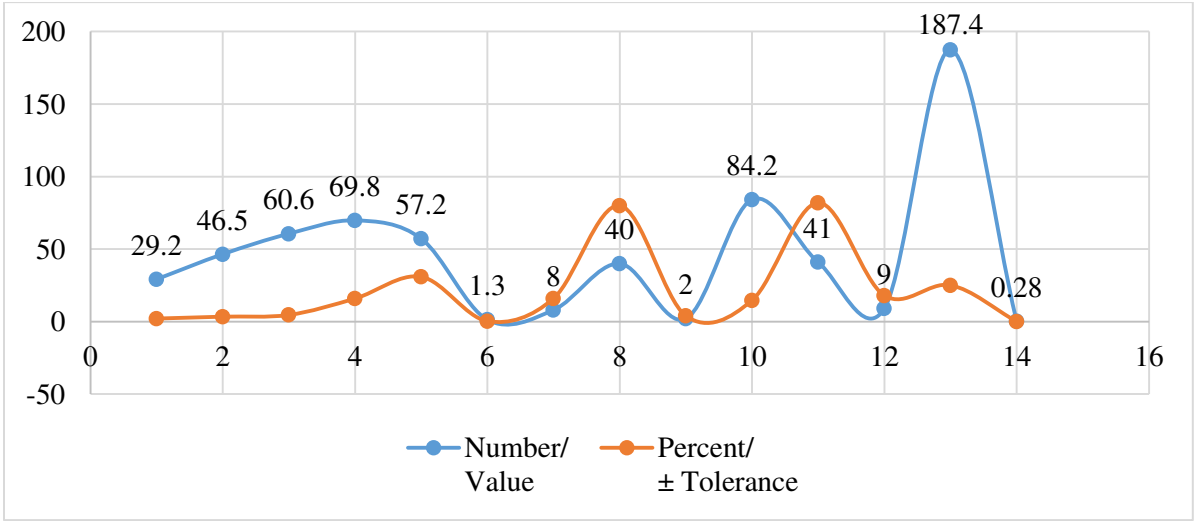
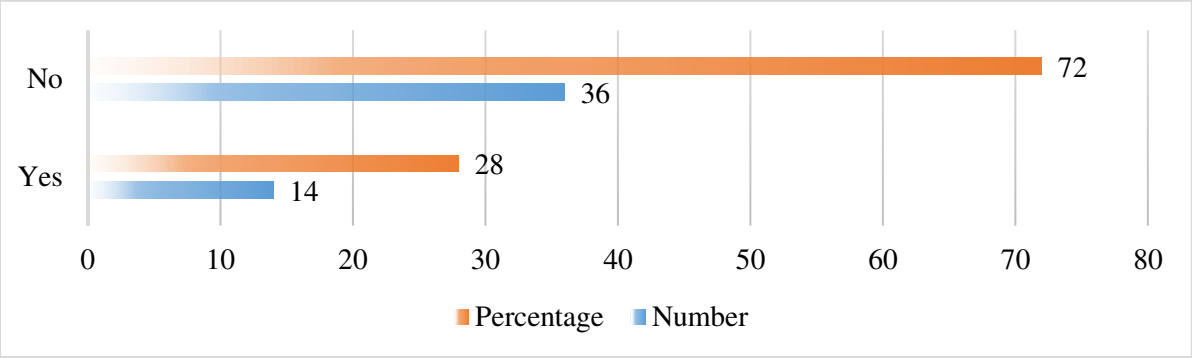


Table – IV: LVDD Presence

LVDD Presence	Number	Percentage
Yes	14	28
No	36	72



DISCUSSION:

In our study, the average patient's age was (60.7 ± 6.2) years similar to the study of Dzudie et al [19], where average patient's age was 55 years ranging from (26 to 82) years. Likewise, the average age was (62.1 ± 7.7) years in the study of Suchoe et al. which is just about the same and equivalent to our study [20]. Smoking history of the patients in our study was 86% which is similar to the study of Abroug et al. where smoking history was 83% [21].

As per the study of Suchoe et al, standard FEV1 was (40 ± 8.9) which is identical to our study i.e. (45.7 ± 13.1) [20]. The average internal diameter LV systolic in our study was (29.2 ± 2.21) and LV diastolic was (46.5 ± 3.4), which is as good as Suchoe et al study, where standard internal diameter LV systolic was (33.2 ± 4.2) and LV diastolic was (38.0 ± 11.2) [20]. In the same way in one more study led by Boussouges et al [11], the LV diastolic internal diameter was (48 ± 4.5), which is alike to our study.

As identical (69 ± 9) percent to the study of Rocha et al, the standard EF of the patients as per our research was (60.6 ± 4.6) percent [22]. The standard ratio of E/A was (1.3 ± 0.3) in our study which is alike (1.07 ± 0.3) to the study of Alchanatis et al [23]. As per the Alchanatis et al. study, standard time for isovolumetric relaxation was (85.6 ± 8.8) m sec, comparable this time was (84.2 ± 14.7) m second our study [23]. Left ventricular diastolic dysfunction in our research was in 28% patients as compared to the study of Abroug et al, (31.1%) and Paudel et al. (26.7%), and was straight away relational to the brutality of the syndrome [21, 24].

CONCLUSION:

LV diastolic dysfunction had in the COPD Patients and was associated to rise in pulmonary artery pressure, however, no LV systolic dysfunction noted. Foregoing in view, for in time diagnostics of cardiac involvement, all patients of COPD essentially required routine echocardiography.

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