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A Prospective Study On The Correlation Between Six Minute Walk Test And Forced Expiratory Volume At One Second In Chronic Obstructive Pulmonary Disease Patients

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ABSTRACT
COPD is a major cause of morbidity and mortality around the world. At present COPD is diagnosed and severity is assessed by spirometry base on FEV1 / FEC ratio and FEV1 percentage. In order to substitute spirometry a prospective cross sectional study is conducted to find the correlation between 6MWD and FEV1 for grading of COPD severity as per GOLD criteria. Materials and methods used are, a spirometer, pulse oximeter, bp apparatus, timer and 30meter hall was used to conduct the study from 70 patients diagnosed as COPD according to GOLD criteria. Study was conducted at chest hospital, Calicut, India from 2012 to 2014. Correlation between 6MWD and FEV1 was calculated using Spearmans Rank correlation coefficient. The results obtained are that, there was no correlation between six minute walk distance and FEV1 in COPD patients. There was significant statistical association between FEV1 and SpO_2, i.e. as severity of airflow obstruction based on FEV1 values increases, chances of de-saturation also increases. And it is concluded that, there was no correlation between six minute walk distance and FEV1 in COPD patients.

KEYWORDS: Six minute walk test, Chronic obstructive pulmonary disease (COPD), forced expiratory volume in 1second (FEV1), 6-min walk distance (6MWD), Spirometry, pulse oximeter, GOLD guidelines, Burden of Obstructive Lung Disease (BOLD)

INTRODUCTION:
Chronic obstructive pulmonary disease (COPD) is a major cause of disability and death all over the world. Its prevalence is increasing worldwide and is now the fourth leading cause of death world over. Factors, including forced expiratory volume in 1second (FEV1), gas exchange disturbances, lung hyperinflation airway hyper-responsiveness, severity of dyspnea, pulmonary hypertension, malnutrition-impaired exercise capacity and health-related quality of life, anemia and other co morbidities have been identified as individual predictors of mortality in COPD. Spirometry is the present gold standard diagnostic tool for diagnosing COPD. FEV1/FVC ratio is generally used to define the presence or absence of airflow limitation, but FEV1 is used to define the severity of the disease. To assess the functional status of patients with COPD a 6-min walk distance (6MWD) test a sub maximal exercise test can be used. 6 MWD test had proved to be reliable, inexpensive, safe and easy to apply. The global and integrated response of all systems involved during exercise like cardiovascular, pulmonary, musculoskeletal and neuromuscular is evaluated by 6 MWD. As spirometry depends on effort, all patients may not be comfortable in doing the test. Very severe COPD patients, based on FEV1 have variable exercise ability. On the other hand 6MWD test is easy to perform as it is representing daily activity. If there is correlation between 6MWD and FEV1, 6MWD test can be used for assessing the severity of COPD where spirometry cannot be done. In this study, the relation between 6MWD test and spirometric parameter FEV1 in patients with COPD is investigated. Aim and objective of this study is to test the validity of 6 minute walk test (6MWT) in assessing the severity of COPD which is measured by means of FEV1 as per the GOLD criteria (Table 1).

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Table-1: Gold Criteria

GOLD 1	**MILD**	**FEV1/FVC < 0.70**	**FEV1 ≥ 80 % Predicted**
GOLD 2	MODERATE	FEV1/FVC < 0.70	50% ≤ FEV1 < 80 % Predicted
GOLD 3	SEVERE	FEV1/FVC < 0.70	30 % ≤ FEV1 < 50 % Predicted
GOLD 4	VERY SEVERE	FEV1/FVC < 0.70	FEV1 < 30 % Predicted

MATERIALS AND METHODS:

MATERIALS:

1. Spirometer (vitalograph)
2. Pneumotrac spirotrac 6800: flow head, tubing.

MATERIALS FOR SIX MINUTE WALK DISTANCE:

1. Countdown timer (stopwatch)
2. Mechanical lap counter
3. Two small cones to mark the turnaround points
4. A chair that can be easily moved along the walking course
5. Worksheets on a clipboard
6. A source of oxygen
7. Sphygmomanometer
8. Telephone
9. Automated electronic defibrillator

METHODS:

Spirometry is performed in a room with the patient sitting comfortably. The procedure is performed according to ATS guidelines. COPD is diagnosed according to GOLD guidelines (Table-1). The 6MWT should be performed indoors, along a long, flat, straight, enclosed corridor with a hard surface that is seldom traveled. The walking course must be 30 m in length. A 100-ft hallway is, therefore, required. The length of the corridor is marked every 3 m. The turnaround points should be marked with a cone (traffic cone). A bright colored tap eon the floor which marks the beginning and end of each 60-m lap, should be marked properly.

PATIENT PREPARATION:

1. Comfortable clothing should be worn.
2. Appropriate shoes for walking should be worn.
3. Patients should use their usual walking aids during the test (cane, walker, medical regimen should be continued).
4. A light meal is acceptable.
5. The patient's usual before early morning or early afternoon tests.
6. Patients should not have exercised vigorously within 2 hours of beginning of test.

Patients who are diagnosed to have COPD by history, physical examination and spirometry are made to do six minute walk test on the same day. Patients are selected according to the inclusion and exclusion criteria. The 6MWT is conducted in ICU of our hospital.

Calculating BMI:

The distinction between overweight and obesity is made on the basis of the body mass index (BMI):

BMI = body weight (in kg) ÷ height (in meters) ^{2}

The BMI can also be obtained from a nomogram, a table, or a calculator Classification of BMI - The recommended classifications for BMI adopted by the National Institute of Health (NIH) and World Health Organization (WHO). The definition of overweight and obesity varies by race. The WHO and NIH guidelines are currently applied to blacks, hispanics and whites. For Asians, overweight is a BMI between 23 and 29.9 kg/m^2 and obesity a BMI >30 kg/m$^{2.}$. We have considered obesity as BMI >30kg/m^2 and below it as non-obese.

METHOD OF DATA COLLECTION:

Medical records, spirometric data and six minute walk distance of 70 COPD patients were collected for analysis from the period October 2012 to May 2014. All eligible patients had been monitored in the Dept of Respiratory Medicine of Chest Hospital, Calicut. Data regarding age gender and BMI were

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analysed.6MWD AND FEV1 is correlated using Spearman's rank correlation coefficient. All the associations were calculated with Chi square test. Statistical analysis were done using SPSS version 18. This prospective cross sectional study conducted in Dept of respiratory medicine, chest hospital Calicut consisted of 73 patients sample size. This study has obtained clearance from internal ethical committee of the institution. The duration of this study was From OCTOBER 2012 to MAY 2014.

Inclusion criteria: Patient diagnosed with COPD as per gold criteria between age 40 to 85 years.

Exclusion criteria: COPD patients with acute exacerbations within last 6 weeks, Post bronchodilator reversibility > 12% and >200 ml, Patients receiving domiciliary oxygen therapy, Patients who could not perform spirometry or walk test, Patients with other diseases affecting respiratory and cardiovascular systems, Recent thoracic or abdominal surgery/eye surgery or retinal detachment, Patients who were musculoskeletal pain limiting, claudication pain and syncope, Recent history of myocardial infarction, and Unstable angina.

Sample size is calculated by using the formula:

$$n = \frac{[Z1\text{-}\alpha/2\ [\sqrt{2\ \pi^0(1-\pi^0)}] + Z1\text{-}\beta\ [\sqrt{[\pi^1(1-\pi^1)+\pi^2(1-\pi^2)]}]^2}{(\pi^2-\pi^1)^2}$$

n = sample size.

Z1- α/2 π is a constant, if alpha error is 5% its value = 1.96β

Z1- β is a constant, if beta error is 20% its value =0.84

π^1 is sensitivity/specificity of a gold standard test =100%

π^2 is the expected sensitivity/specificity of this test= 90%

π^0 is the average of π^1 & π^2

$$n = \frac{\{(1.96\times0.308) + (0.84\times0.3)\}^2}{(0\ .01)}$$

= 73

By applying this equation calculated sample size is 73.

RESULTS:

1. Majority of the patients were males, contributing more than three fourth in this study. Among 70 patients selected for study, 77.1% were males and 22.9% were females. Of the 70 patients, 47.1% were from age group 60-69Yrs (Table-2 and Fig-1).

Table-2: Distribution of age

Age	Frequency	Percent
40-49	4	5.7
50-59	16	22.9
60-69	33	47.1
70-79	15	21.4
≥ 80	2	2.9
Total	70	100.0

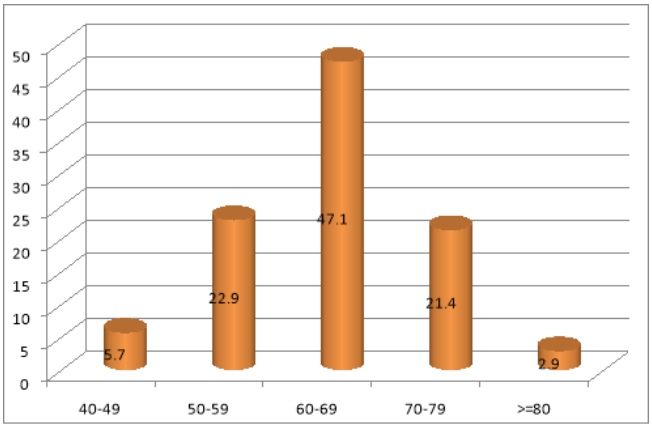

Fig-1: Distribution of patients according to age group

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2. Majority of the patients were normal by BMI. 20% were underweight and 17.1 % were of overweight or obese (Table-3 and Fig-2).

Table-3: Distribution of BMI

BMI Category	Frequency	Percent
Under Weight	14	20.0
Normal Weight	44	62.9
Over Weight	9	12.9
Class I Obese	2	2.8
Class II Obese	1	1.4
Total	70	100.0

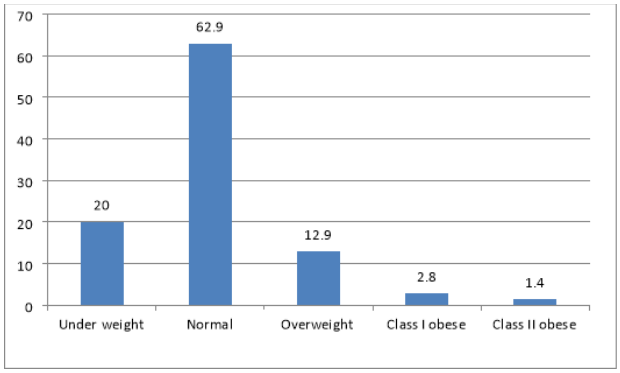

Fig-2: Distribution of COPD patients according to BMI

3. 44% of patients were having moderate airflow obstruction, 37% severe, 14.3% very severe and 4.3% mild airflow obstruction according to GOLD staging of COPD based on FEV1(Table-4 and Fig-3).

Table-4. Distribution of severity based on FEV1.

Severity	Frequency	Percent
Very severe	10	14.3
Severe	26	37.1
Moderate	31	44.3
Mild	3	4.3
Total	70	100.0

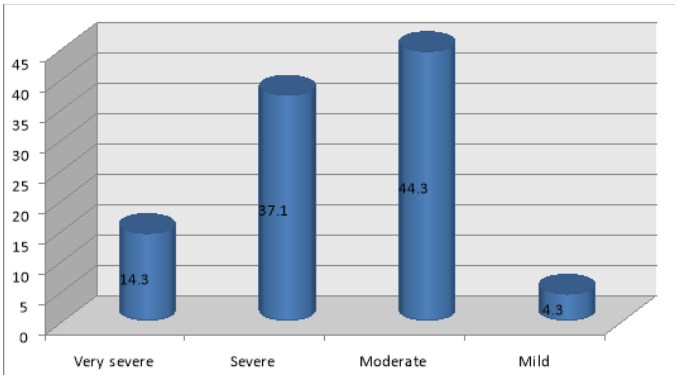

Fig-3. Distribution of severity OF COPD based on FEV1

4. 34.3% patients had six minute walk distance of range 201-300 meters. 32.9% patients walked less than 200 meters, 20% had 6MWD of 301-400 meters, while 12.9% walked more than 400 meters (Table-5).

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Table-5: Distribution of 6-Minute Walk distance

6 Minute Walk Distance	Frequency	Percent
<200	23	32.9
201-300	24	34.3
301-400	14	20.0
>400	9	12.9
Total	70	100.0

5. Most of the patients had 21-30 pack years of smoking (Table-6). p-value obtained is 0.780 using Chi square test. Indicating severity is independent of gender.

Table-6: Pack years of smoking

Pack years	Frequency	Percent
<10	11	15.7
10-20	12	17.1
21-30	28	40.0
31-40	19	27.1
Total	70	100.0

6. Examination of cell frequency shows that majority of patients fall in moderate and severe group, irrespective of the Gender (Table-7, Fig-4).

Table- 7: Association between FEV1 and Sex

Severity Based on FEV1	Sex		Total
	Male	Female	
Very severe	8 (14.8%)	2 (12.5%)	10
Severe	20 (37%)	6 (37.5%)	26
Moderate	23 (42.6%)	8 (50%)	31
Mild	3 (5.6%)	0	3
Total	54 (100%)	16 (100%)	70

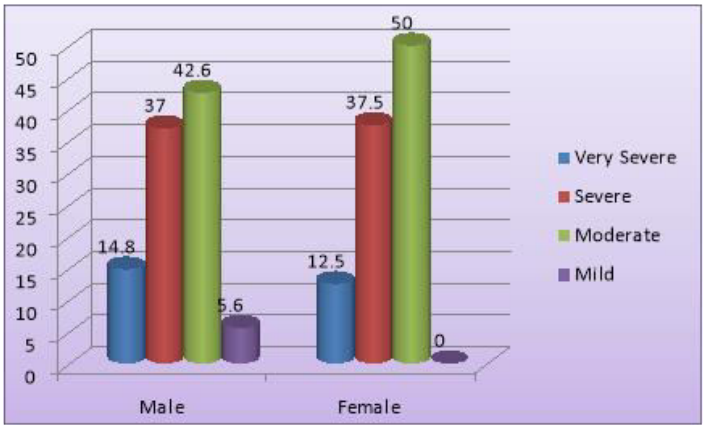

Fig-4. Association between FEV1 and Sex

7. p value obtained is 0.994 which is not significant indicating that there is no association between FEV1 and age in our study (Table-8, Fig-5).

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Table-8: Association between FEV1 and Age

Severity based on FEV1	Age		Total
	< 60	≥ 60	
Very severe	3(15%)	7(14%)	10
Severe	7(35%)	19(38%)	26
Mild	9(45%)	22(44%)	31
Moderate	1(5.0%)	2(4%)	3
Total	20(100%)	50(100%)	70

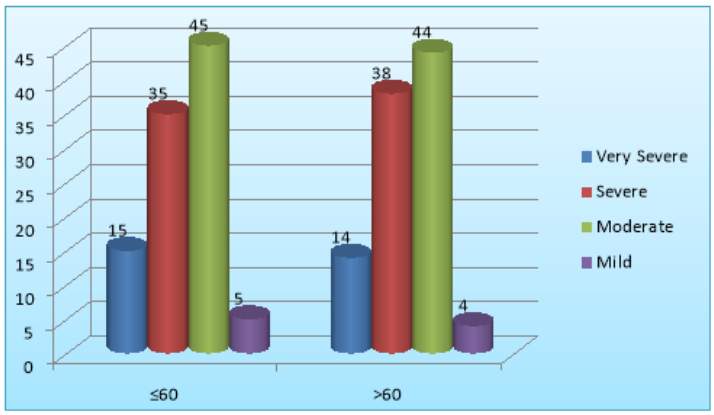

Fig-5: Association between age and severity of copd

8. As p-value 0.191 there was no association between FEV1 and BMI (Table-9, Fig-6). P-value of 0.047 was found to be indicating association between 6 minute walk distance and sex.

Table- 9: Association between FEV1 and BMI

Severity Based on FEV1	BMI		
	Under Weight	Normal Weight	Over Weight/ Obese
Very severe	2(14.3%)	7(15.9%)	1(8.3%)
Severe	7(50.0%)	16(36.4%)	3(25.0%)
Moderate	3(21.4%)	20(45.5%)	8(66.7%)
Mild	2(14.3%)	1(2.2%)	0

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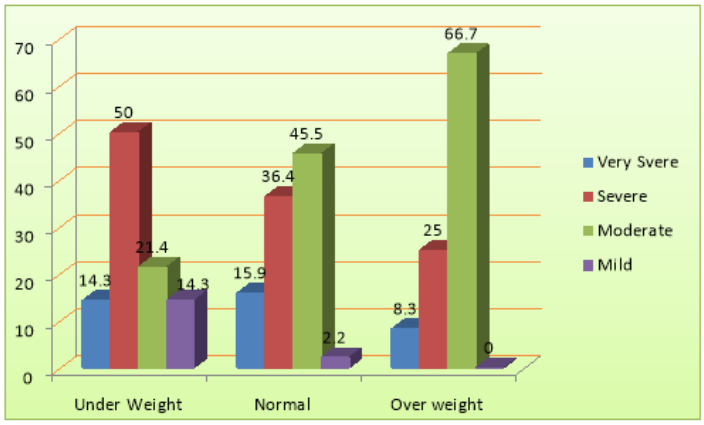

Fig-6: Association between severity of COPD and weight distribution

9. In this study female (56%) patients walked less than 200 meters, while 38.9% of male patients walked more than 300 meters (Table-10, Fig-7). In patients above the age of 60 years, 36% (i.e. 18 out of 50) walked less than 200 meters, similarly 36% patients less than 60 years of age walked 201-300 meters.

Table-10: Association between 6 minute walk distance and Sex

MWD	Sex		Total
	Male	Female	
<200	14 (25.9%)	9 (56.3%)	23 (32.9%)
201-300	19 (35.2%)	5 (31.3%)	24 (34.3%)
>300	21 (38.9%)	2 (12.5%)	23 (32.9%)
Total	54 (100%)	16 (100%)	70 (100%)

*p- Value 0.047, significant

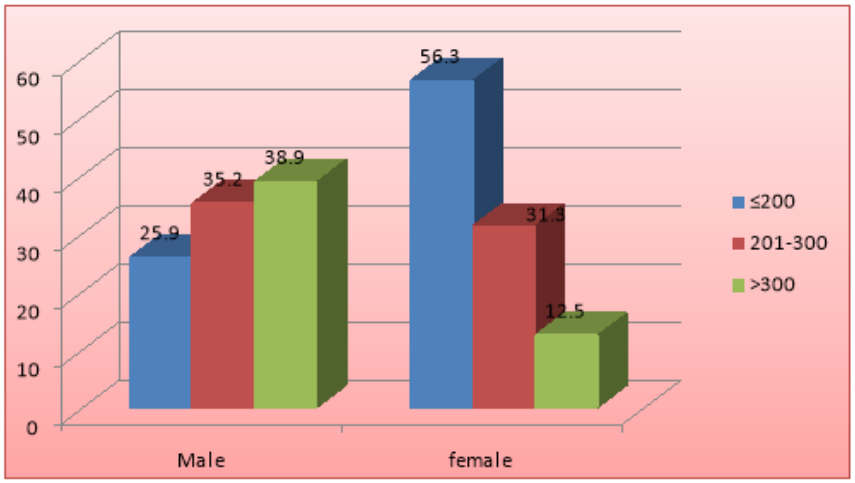

Fig-7: Association between 6 minute walk distance and Sex

10. In patients less than 60 years, majority 45% (9 out of 20) walked more than 300 meters in 6 minutes but p value was found to 0.380 which is not significant suggesting no correlation between 6MWD and age(Table-11, Fig-8) .

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Table-11: Association between 6 minute walk in distance and Age

6MWD	Age		Total
	<60	≥60	
<200	5 (25%)	18 (36%)	23 (32.9%)
201-300	6 (30%)	18 (36%)	24 (34.3%)
>300	9 (45%)	14 (28%)	23 (32.9%)
Total	20 (100%)	50 (100%)	70(100%)

*p-value 0.380, not significant

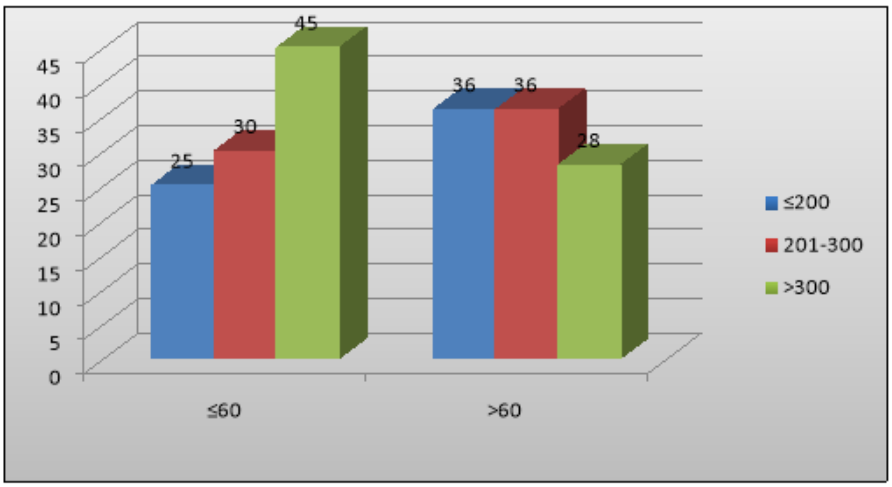

Fig-8: Association between 6 minute walk in distance and Age

11. The correlation obtained between the variable is a low positive one having correlation coefficient r= 0.089, not statistically significant (p value 0.461). There is no correlation between six minute walk distance and FEV1 in COPD patients (Fig-9).

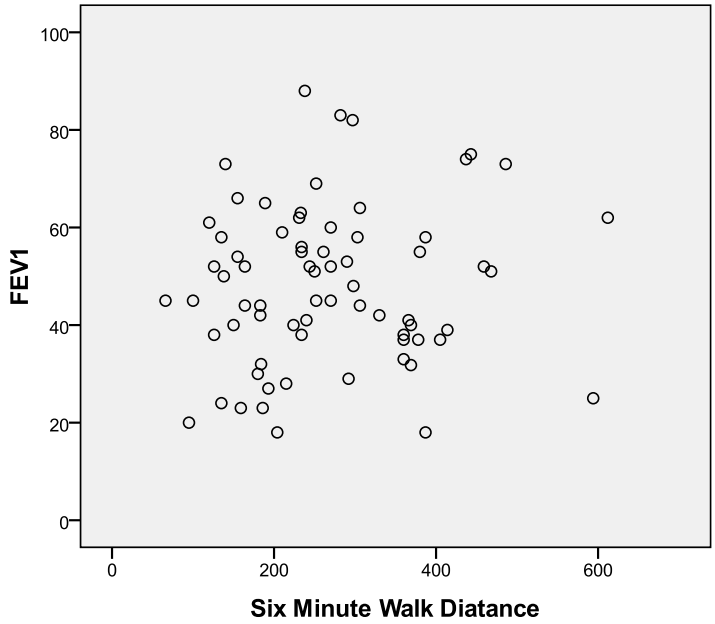

Fig-9: Scatter plot of FEV1 and 6 Minute walk distances

DISCUSSION:

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Chronic obstructive pulmonary disease (COPD), a common preventable and treatable disease is characterized by persistent airflow limitation that is usually progressive and associated with enhanced chronic inflammatory response in the lung to noxious particles and gases. Exacerbations and comorbidities contribute to overall severity in individual patients[1]. According to the Burden of Obstructive Lung Disease (BOLD) study, the average prevalence of COPD is 10.1%, with wide variation[2]. The prevalence of COPD in India was 3.67% (4.46 and 2.86% among males and females, respectively). The estimated burden of COPD in India is about 15 million cases (males and females contributing to 9.02 and 5.75 million, respectively)[3,4]. Chronic obstructive pulmonary disease (COPD) is the fourth leading cause of death in the world[1]. In India, COPD causes about 500,000 deaths per year[5]. According to the preliminary report of the "Million Death Study", CRDs were the second and the third common cause of death among adults in rural and urban population[6]. Globally, COPD is the ninth leading cause of loss of disability adjusted life years (DALYs) according to the Global Burden of Disease Study (GBDS)[7]. In India, chronic respiratory diseases (CRDs) account for 3% of DALYs, and COPD is the major cause among CRDs[8]. COPD also accounts for more than 3 million deaths per year globally making it the third leading cause of death worldwide[9]. It accounts for 2.3-8.4% of all deaths. This proportion is more among men than women, and more among the elderly as compared to the young[10,11] .

Risk factors of COPD mainly includes of smoking. Tobacco is abused in two forms, mainly smoking and smokeless tobacco, Pipe, cigar and water pipe are various forms of tobacco smoking. Environmental Tobacco Smoke is the passive exposure to cigarette smoke. The rise in COPD incidence has paralleled the rise in tobacco smoking throughout the world[12,13]. There is a strong dose-response relationship (for amount and duration) between tobacco smoking and COPD[14,15]. The risk of COPD increases with increase in the number of cigarettes/ bidis as well as with the duration of smoking. Any amount of smoking is harmful, although the risks are lower at low dose[16.] Prevalence of COPD in smokers with less than 20 pack years was 9.6%, and 18% in smokers with more than 20 pack years[17]. In India more than 70% people use biomass fuel for cooking purposes compared to 25% who smoke. Burning of biomass fuel such as dried dung, etc is associated with various health hazards, including respiratory problems like COPD which is the biggest risk factor for COPD in India[18]. About 15% of COPD cases might be related to exposure at workplace like rubber, plastics, and leather manufacturing, textile mill product manufacturing; and food product manufacturing [19]. AAT deficiency and mutations in glutathione s-transferase-1 are associated with COPD[20]. Other risk factors for COPD may include air pollution, socioeconomic factors, asthma/bronchial hyperactivity, chronic bronchitis, and infections like Tuberculosis.

Inhaled cigarette smoke and noxious particles causes inflammation of lung which may induce parenchymal tissue destruction resulting in emphysema, disrupt the normal repair and defence mechanisms. These pathological change leads to air trapping and progressive airflow limitation. Oxidative stress and excess of proteinases in the lung modify lung function and is an important mechanism in COPD. Oxidants such as hydrogen peroxide, 8-isoprostane are biomarkers of oxidative stress. Protease – antiproteinase imbalance causes destruction of elastin leading to emphysema.
Inflammatory cells: Increased number of CD8+ (cytotoxic) TC1 lymphocytes along with neutrophils macrophages interact with structural cells in airways, lung parenchyma, vasculature and cause disease[21.] Inflammatory mediators like chemotactic factors, cytokines, growth factors are increased in COPD. Systemic manifestation of COPD include unintentional weight loss, skeletal muscle dysfunction, increased risk of cardiovascular disease, osteoporosis, and depression. COPD patients have raised levels of CRP, fibrinogen, leucocytes, and TNF-a, indicating that persistent systemic inflammation is present in COPD[22].

Inflammation, fibrosis, luminal exudates in the small airways causes reduction in FEV1 and FEV1/ FVC ratio. Peripheral airway obstruction along with destruction of alveolar attachments to airways causes air trapping during expiration, resulting in hyperinflation. Hyperinflation reduces inspiratory capacity, increases functional residual capacity, causing dynamic hyperinflation during exercise resulting in exhertional dyspnea. Gas transfer for O_2 and CO_2 decreases as the disease progresses. Reduced ventilation may also be due to reduced ventilator drive which leads to carbon dioxide retention. These abnormalities in the alveolar ventilation and reduced pulmonary vascular bed worsen the VA/Q abnormalities[23]. Hypoxic vasoconstriction causes remodeling of pulmonary vasculature such as hypertrophy / hyperplasia of pulmonary vascular smooth muscles, intimal thickening and causes pulmonary hypertension. Endothelia Cell Dysfunction and loss of pulmonary capillary bed in

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emphysema contribute to increased pressure in the pulmonary circulation. Pulmonary hypertension leads to RVH and finally leads to right sided heart failure.

Characteristic symptoms of COPD are chronic progressive dysnea, cough and sputum production that can be variable from day to day. Cough is often the first symptom to develop. Chronic cough and sputum production may precede the development of airflow limitation by many years, nevertheless may be unproductive sometimes. Purulent sputum reflects an increase in inflammatory mediators and onset of bacterial exacerbation. Dyspnea is the cardinal symptom. Patients describe as sense of increased effort to breathe, heaviness, air hunger, or gasping which is progressive, persistent and worse with exercise. Wheezing and chest tightness may vary between days, and over the course of single day. A diagnosis of COPD cannot be excluded by absence of wheezing or chest tightness. Additional features include fatigue, weight loss, anorexia. Symptoms of depression or anxiety may also coexist [24].

A clinical diagnosis of COPD should be considered in any patient who has dysnea, chronic cough or sputum production, and a history of exposure to risk factors for the disease. Spirometry is required to make diagnosis. Post bronchodilator FEV1/FVC < 0.70 confirms the presence of limitation and thus of COPD. Classification of severity of airflow limitation in COPD (based on post bronchodilator FEV1)(Table-11) .

Once COPD has been diagnosed, effective management should be based on an individual assessment of disease in order to reduce current symptoms and future risk.
Goals for treatment of stable COPD by reducing the symptoms, Improve exercise tolerance and improve health status. Reduce the risk by Prevent disease progression, Prevent and treat exacerbations and Reduce mortality. Non pharmacological Treatment includes smoking cessation, physical activity, pulmonary rehabilitation, vaccination and surgical intervention like lung volume reduction surgery, bullectomy and lung transplantation. Pharmacological includes inhaled bronchodilators, inhaled corticosteroids, methyl xanthenes, phosphodiesterase inhibitors, systemic corticosteroids, oxygen therapy and non invasive ventilation.

Six minute walk test: Stair climbing, a 6MWT, a shuttle-walk test, detection of exercise-induced asthma, a cardiac stress test, and a cardiopulmonary exercise test[25,26] are the most popular clinical exercise tests in order of increasing complexity. Among this 6 MWT is easy to perform. It is better tolerated, and reflects the activities of daily living than the other similar walk tests. It requires only a 100-ft hallway and practically a easier test. There is no need of exercise equipment or advanced trained technicians. Walking is an activity performed daily by all but the most severely impaired patients. This test measures the distance that a patient can walk as fast as possible on a flat, hard surface in a period of 6 minutes (the 6MWD). It evaluates the global and integrated responses of all the systems involved during exercise, including the pulmonary and cardiovascular systems, systemic circulation, peripheral circulation, blood, neuromuscular units, and muscle metabolism. It does not provide on the function of each of the different organs and systems involved in exercise or the mechanism of exercise limitation, as is possible with maximal cardiopulmonary exercise testing. The submaximal level of functional capacity can be assessed by self-paced 6MWT. Patients can choose their own intensity of exercise and they also can stop and take rest during the test as patients do not achieve maximal exercise capacity during the 6MWT. The 6MWD may better reflect the functional exercise level for daily physical activities. The strongest indication for the 6MWT is for measuring the response to medical interventions in patients with moderate to severe heart or lung disease.

The 6MWT does not determine peak oxygen uptake, diagnose the cause of dyspnea on exertion, or evaluate the causes or mechanisms of exercise limitation[25,26]. The data collected from a 6MWT should be regarded as complementary to cardiopulmonary exercise testing, but not a replacement. Even though there is difference between these two functional tests, some good correlations have been reported. For example patients with end-stage lung diseases reported a significant correlation (r-0.73) between 6MWD and peak oxygen uptake.. The reproducibility of the 6MWD (with a coefficient of variation of approximately 8%) appears to be better than the reproducibility of 1-second forced expiratory volume in patients with chronic obstructive pulmonary disease (COPD)[27].

Indications for the six-minute walk test includes- Pre-treatment and post-treatment comparisons, Lung transplantation, Lung resection, Lung volume reduction surgery, Pulmonary rehabilitation, COPD, Pulmonary hypertension Heart failure, Functional status (single measurement)COPD, Cystic fibrosis, Heart failure, Peripheral vascular disease, Fibromyalgia, Older patients, Predictor of morbidity and

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mortality, Heart failure. Primary pulmonary hypertension. Absolute contraindications for the 6MWT include unstable angina during the previous month and myocardial Infarction during the previous month.

If the Patients are having any of these findings he/she should be referred to the physician ordering the test for individual clinical assessment. The readings from a resting electrocardiogram done during the previous 6 months should also be reviewed before testing. Stable exertional angina is not an absolute contraindication for a 6 MWT, but patients with these symptoms should perform the test after using their antiangina medication, and rescue nitrate medication should be readily available. The 6MWT is a useful measure of functional capacity targeted at people with at least moderately severe impairment. The test has been widely used for preoperative and postoperative evaluation and for measuring the response to therapeutic interventions for pulmonary and cardiac disease.

SPIROMETRY: Spirometry is a physiological test that measures how an individual inhales or exhales volumes of air as a function of time. The primary signal measured may be volume or flow. Indications of spirometry can be categorized as diagnostic, monitoring, disability/impairment evaluation and public health. Under diagnosis evaluate symptoms, signs or abnormal laboratory tests , measure the effect of disease on pulmonary function, screen individuals at risk of having pulmonary disease, assess pre-operative risk , assess prognosis and to assess health status before beginning strenuous physical activity programmes[28]. Spirometry uses include monitoring of therapeutic intervention, describe the course of diseases that affect lung function, people exposed to injurious agents and to monitor for adverse reactions to drugs with known pulmonary toxicity. In public health for Epidemiological surveys, derivation of reference equations and for clinical research. Contraindications of spirometry includes Haemoptysis of unknown origin, Pneumothorax, Unstable cardiovascular status or 'recent' myocardial infarction or pulmonary embolus, Thoracic, abdominal or cerebral aneurysms , 'Recent' eye surgery (eg, cataract), Presence of an acute illness or symptom that might interfere with test performance (eg, nausea, vomiting) and Recent thoracic or abdominal surgery.

FEV1 AND FVC MANOEUVRE: FVC is defined the maximal volume of air exhaled with maximally forced effort from a maximal inspiration, i.e. vital capacity performed with a maximally forced expiratory effort, expressed in litres at body temperature and ambient pressure saturated with water vapour (BTPS). FEV1 is the maximal volume of air exhaled in the first second of a forced expiration from a position of full inspiration, expressed in litres at BTPS. There are three distinct phases to the FVC manoeuvre, are maximal inspiration, a ''blast'' of exhalation; and continued complete exhalation to the end of test (EOT). Many studies have suggested a relationship between the six minute walk test and pulmonary function test PFT parameters in patients with COPD. In a study by Hatem FS Al Ameri et al[29], in 2006, they found correlation of 6 minute walk distance with DLCO, FVC and FEV1 published in Iranian Heart Journal 2005. In another study conducted in India by Manoj Khandelwal et al[30] 6MWD negatively correlated to breathlessness (MMRC grade), there was statistically significant association between 6MWD to all spirometry parameters like FEV1 % predicted, FVC% predicted. The different GOLD stages were found to have positively correlated to 6MWD. A study conducted by Anil Kumar Kodavala[31] showed no statistical correlation between 6MWD AND FEV1. Since many studies all over the world showed significant correlation between 6MWD and FEV1 in COPD, this study emphasizes the significance of correlation between 6MWD and FEV1 in COPD patients.

CONCLUSION:

COPD is one of the most common chronic disorder encountered in day today practice of both respiratory physician and general practitioner. To confirm a diagnosis of COPD and grade its severity spirometry is the current gold standard. But since spirometry is a specialized device which requires certain technical knowledge to operate and perform optimal testing, it cant be made available in peripheral health systems. To device a simple test which doesn't require any qualified technician and specialized equipment 6MWT was performed to find the correlation between the distance travelled and FEV1. This study was conducted whether there is correlation between 6MWD and FEV1 and other factors. From this study it was found that

1. There was no correlation between six minute walk distance and FEV1 in COPD patients.
2. Female COPD patients have less six minute walk distance as compared to male COPD patients.
3. No significant association was found between 6MWD and BMI.
4. 6 MINUTE WALK DISTANCE in COPD patients was not associated with BMI in our study.

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5. No association was found between 6MWD and saturation (SpO_2).
6. There was significant statistical association between FEV1 and SpO_2, i.e. as severity of airflow obstruction based on FEV1 values increases, chances of desaturation also increases.

Hence it is safe to conclude that measuring 6 MINUTE WALK DISTANCE is not sufficient for assessment of severity of COPD.

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