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DISSERTATION

"CORRELATION OF 6 MIN WALKING TESTS , SIT TO STAND TESTS AND PULMONARY FUNCTION TEST IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE."

By

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ABSTRACT

Background: Assessment of functional capacity in COPD patients helps in determining the severity of the disease. While spirometry is the Gold standard, 6-min walking test (6MWT) and 1-min sit to stand test (STST) are simple and practical tests to assess exercise capacity and physical condition. This study is conducted to find the diagnostic accuracy of these two tests in comparison with spirometry.

Materials and Methods: A cross-sectional study conducted in the RLJ Hospital, Tamaka on patients diagnosed with COPD. Patients performed 6MWT and STST. Heart rate, BP, SpO2, dyspnea and fatigue according to Borg scale are noted pre and post-tests.

Results: 81.54% of the participants having severe/very severe COPD group, walked <332.49 m and only 18.46% could walk more than 332.50 m, SpO2 decreased from 93.98 ± 0.82 to 91.75 ± 1.39. During the 1-min STS test SpO2 decreased from 93.98 ± 0.82 to 91.75 ± 1.39. A positive correlation is observed between the 1-min sit to stand the test, and it had good predictive validity in predicting COPD as compared with spirometry as indicated by the area under the curve of 0.915 (95% CI 0.866 to 0.963, P value <0.001).

Conclusions: The study demonstrated that 6MWT has a sensitivity of 81.54%, the specificity of 79.25% and 1-min sit to stand test has a sensitivity of 89.23%, specificity of 67.92% in predicting COPD. In a remote clinical setting where spirometry is not available, 6MWT and one-minute STST are the best methods for assessing COPD severity.

Keywords: COPD, 6-metre walk test, one-minute sit to stand the test, functional capacity, spirometry, Kellegren-Lawrence grade.

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LIST OF ABBREVIATIONS

GLOSSARY	ABBREVIATIONS
6MWT	6-min walking test
ATS	American thoracic society
CAT	COPD assessment test
CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
DBP	Diastolic blood pressure
DLCO	Diffusing capacity of the lungs for carbon monoxide
FEV_1	Forced expiratory volume
FVC	Forced vital capacity
GOLD	Global initiative for Chronic obstructive lung disease
HR	Heart rate
PFT	Pulmonary function tests
ROC	Receiver Operative curve
RV	Residual volume
SBP	Systolic blood pressure
SD	Standard deviation
STST	Sit to stand test
TLC	Total lung capacity

INTRODUCTION

INTRODUCTION:

India has an increasing burden of chronic respiratory diseases. Chronic obstructive pulmonary disease (COPD), asthma, pneumoconiosis, interstitial lung diseases, and pulmonary sarcoidosis are included in chronic respiratory diseases. COPD and asthma occur more commonly among all the common chronic respiratory diseases.[1]

Worldwide, one of the leading non-communicable causes of mortality is identified as COPD.[1] COPD is a progressive inflammatory disease of the lung characterized by chronic bronchitis, airway thickening and EMPHYSEMA. Globally, it accounts for around 5% of the mortality. Around 90% of COPD deaths are from low- and middle-income countries. In India, approximately 30 million people were diagnosed with COPD. Worldwide, the mortality rate caused by COPD was identified highest in India.[2]

COPD is the 4th leading cause of mortality in the year 2004, leading to a death of 3 million worldwide. The death rates increased to 4.5 million deaths by the year 2008.[3]By the year 2030, it can reach 5.8 million deaths per year.[3] Over the last 20 years, deaths from COPD have increased, especially in females.

A major risk factor for COPD is cigarette smoking, and also chronic exposure to the burning biomass fuel such as wood, cow-dung and crop-residues leads to release of air pollutants like SO2, CO, NO2, formaldehyde and particulate matters smaller than 10 microns in size in the ambient indoor air can cause COPD.[4,5]

Asthma, advanced age, low educational level, occupational exposure to noxious agents and airway infections during growing up years are found to be the risk factors for COPD among non-smokers.(6) Dyspnea, chronic cough (productive or not), low exercise capacity, audible wheezing, more frequent or longer-lasting bronchial infections and weight loss in an advanced stage of COPD are the signs and symptoms involved in COPD.[6]

Heart disease, cancer, depression and anxiety, decreased bone mineral density, musculoskeletal and connective tissue disorders, vascular disorders, gastrointestinal, endocrine or metabolic or nutrition diseases, sleep disorders are the co-morbidities associated with COPD.[7] Respiratory failure is the leading cause of mortality in patients with very advanced COPD. Respiratory failure can occur as acute, chronic, or acute-on-chronic failure in patients with COPD.[8]

Pulmonary function tests (PFT) are considered to be the "gold standard" for the diagnosis of COPD. Spirometry, lung volumes and diffusion capacity of the lung for carbon monoxide are the three basic components of pulmonary function testing. COPD can affect each of these components. Spirometry airflow measures or PFT results are used to measure the severity of COPD.

In normal healthy adults, the ratio of forced expiratory volume in one second to forced vital capacity ranges between 70% and 80%. Respiratory dysfunction, such as that in COPD, is associated with the values of less than 70% of the predicted value.[9] In patients with COPD, mild COPD is denoted by the predicted $FEV_1/FVC < 70\%$ and $FEV_1 \geq 80\%$ whereas, moderate COPD denoted by predicted $FEV_1 < 80\%$ and severe COPD by predicted $FEV_1 < 50\%$. The predicted $FEV_1 < 30\%$ indicates very severe COPD.[10]

The exercise capacity in patients with COPD can be assessed using the 6 min walk test. The primary outcome measure in 6 min walk test is the distance walked in 6 min. It can be used to evaluate the benefit of pulmonary rehabilitation.[11–13] It is associated with poor health-related quality of life. Hence, it is considered as a potentially useful biomarker in COPD.[14] A 6-minute walk distance <350 m indicates a significant increase in the rate of mortality in patients with COPD.[15]

The sit-to-stand test is considered as a simple and practical test to identify assess the functional capacity in COPD patients. The inability to perform the movements of standing up and sitting down is associated with mortality and with impairment of function and mobility.[16]The sit-to-stand test can be used to indirectly determine exercise tolerance as well as the lower extremity skeletal muscle function.[15]

In Shah H, et al[17], study a significant difference was identified in HR, SBP and DBP. SMWT at the end of both 6MWT and STST. Gurses HN et al[18], conducted a cross-sectional study in COPD patients in which a moderate correlation identified between 30 and 60 seconds STS tests and 6MWT. Whereas, a weak correlation between 10 seconds of STS test and 6MWT. Similarly, a weak correlation identified between borg fatigue scores after 10, 30, and 60 seconds STS tests and fatigue score after 6MWT. While 10, 30, and 60 seconds STS tests were moderately correlated with 6MWT.

In 50 COPD patients,Beaumont M et al[19], performed a study the heart rate and SpO2 were significantly different with 6MWT and 3MStepT(3 minute Step test). Also, the lower limb fatigue was identified higher after the 3MStepT((3 minute Step test) with 3.4 ± 2.4. Reychler G et al[20], performed a study in 42 COPD patients in which the STST and 6MWT were

identified with “good repeatability”. Variations of heart rate and pulsed O2 saturation for STST and 6MWT were identified significantly different.

The need for the study

COPD is a major cause of morbidity and mortality and is predicted to become the 3rdleading cause of death worldwide in 2030.[21] One of the major goals in COPD management should be the improvement in functional status as per the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines. Several tests are now available to measure functional exercise capacity. 6-min walking test and sit to stand test are the most commonly used clinical exercise tests. 6-min walking test measures distance covered over a span of 6 minutes, which is reflective of activities of daily living. Whereas, the one min Sit to Stand test measures the ability to stand up from a sitting position, which is an essential activity as walking in daily life. Spirometry is now being considered as the Gold standard for measurement of Pulmonary function. The relationship between the 6-minute walk test and pulmonary function test in stable COPD remains limited in data. So, the aim of the present study is to evaluate the functional capacity among COPD patients by the Sit to stand the test and 6-minute walking test and also to compare results of both tests to parameters of Pulmonary function test.

AIMS & OBJECTIVES

AIMS AND OBJECTIVES:

Objectives:

- To perform Pulmonary function test in patients with COPD.
- To perform a 6-minute walking test (6MWT) in patients with COPD.
- To perform Sit to stand test (STST) in patients with COPD.
- To measure diagnostic accuracy of 6MWT in COPD and in comparison, to Gold standard test (Spirometry).
- To measure diagnostic accuracy of STST in COPD and in comparison, to Gold standard test (Spirometry).
- To correlate 6-minute walking test (6MWT) and Sit to stand test (STST) with pulmonary function test in a patient with COPD.

REVIEW OF LITERATURE

REVIEW OF LITERATURE:

1. COPD

a) Definition

Chronic obstructive pulmonary disease is a progressive inflammatory disease of the lung characterized by chronic bronchitis, airway thickening and EMPHYSEMA. Patients experience a progressive deterioration up to end-stage COPD that is characterized by a very severe airflow limitation, severely limited and declining performance status with chronic respiratory failure, advanced age, multiple co-morbidities and severe systemic manifestations/ complications.[22]

b) Epidemiology- global, India,

Around 65 million people were affected with moderate to severe COPD as per the World Health Organization. In the year 2015, more than 3 million people were died of COPD. Globally, it accounts for around 5% of the mortality. Around 90% of COPD deaths are from low- and middle-income countries. In India, approximately 30 million people were diagnosed with COPD. Worldwide, the mortality rate caused by COPD was identified highest in India.[2] The prevalence of COPD ranges from 2 to 22% in men, whereas, in women from 1.2 to 19%.[23]

c) Criteria for diagnosis

An abnormal low expiratory flow in COPD patients can be demonstrated by spirometry.[24]The ratio of FEV_1 to vital capacity is the most reliable criterion for airway obstruction as per the GOLD recommendations. The vital capacity should be determined by the FVC in the same respiratory maneuver from which the FEV_1 was obtained. Because of the premature

bronchiolar collapse, the patients with COPD may be unable to expire fully in a forced maneuver. Hence, additionally, the vital capacity is measured in an unforced, "slow" inspiratory maneuver.[25] The vital capacity measured in this pattern is known as inspiratory vital capacity. Pulmonary function testing after the administration of a bronchodilator is recommended for the diagnosis, staging of COPD and for the assessment of its course. It provides more reproducible results and also enables more secure differentiation of COPD from asthma.[6]

d) Clinical presentation

Respiratory symptoms like cough or dyspnea in relation with a pharmacologically irreversible, or minimally reversible, airway obstruction that progresses over time (with a mean annual decline of 33–69 mL in forced expiratory volume in one second [FEV_1]) are the characteristic clinical features of COPD.[6] Dyspnea, chronic cough (productive or not), low exercise capacity, audible wheezing, more frequent or longer-lasting bronchial infections and weight loss in an advanced stage of COPD are the signs and symptoms involved in COPD.[6]

e) Causes, risk factors, pathogenesis

The most important cause of COPD is smoking. It accounts for around 85% of the COPD cases, and the remaining 15% can be classified as non-smoking COPD.[22,26–29]In India, the prevalence of non-smoking COPD is about 30-50%. Chronic exposure to the burning biomass fuel such as wood, cow-dung and crop-residues leads to release of air pollutants like SO2, CO, NO2, formaldehyde and particulate matters smaller than 10 microns in size in the ambient indoor air can cause COPD.[4,5] Prolonged exposure to occupational smoke/dust, tuberculosis and Recurrent respiratory infections in childhood are the other risk factors associated with the development of COPD.

Table 1: Risk factors associated with COPD.[30]

- **Genes**
- **Exposure to particles:**

1. Tobacco smoke (10 pack Years; 50% smokers develop COPD)
2. Indoor air pollution from heating and cooking with Biomass fuel in poorly ventilated homes (at least 25 years of exposures)
3. Occupational dusts, organic and inorganic: (attributable Risk 15% in American population)
   a. Automobile-drivers, vehicular mechanics , fertilizer manufacturing, chlorinated organic compounds dyes, explosives, rubber products, metal etching, plastics, ammonia exposure in refrigeration and petroleum refining, grain dust and funguses in farmers, textile mill manufacturing, leather manufacturing, food products manufacturing and sales, beauty care workers and welders in automotive industries.
   b. Exposures to crystalline silica: cement industry, brick manufacturing, pottery and ceramic work, silica sand, granite and diatomaceous earth industries, gold mining, and iron and steel founding
4. Outdoor air pollution

- **Reduced Lung volumes:**

1. Lung growth and development
2. Previous Tuberculosis (28-68% cases of post-treated TB; 2.9-6.6 folds increase risk)
3. Early childhood Recurrent Lower Respiratory infections (2-3 fold risk)
4. Poor Nutrition

- **Female Gender (reason not known)**
- **Old Age (physiological obstruction)**
- **Low-Socioeconomic status(Multi component)**

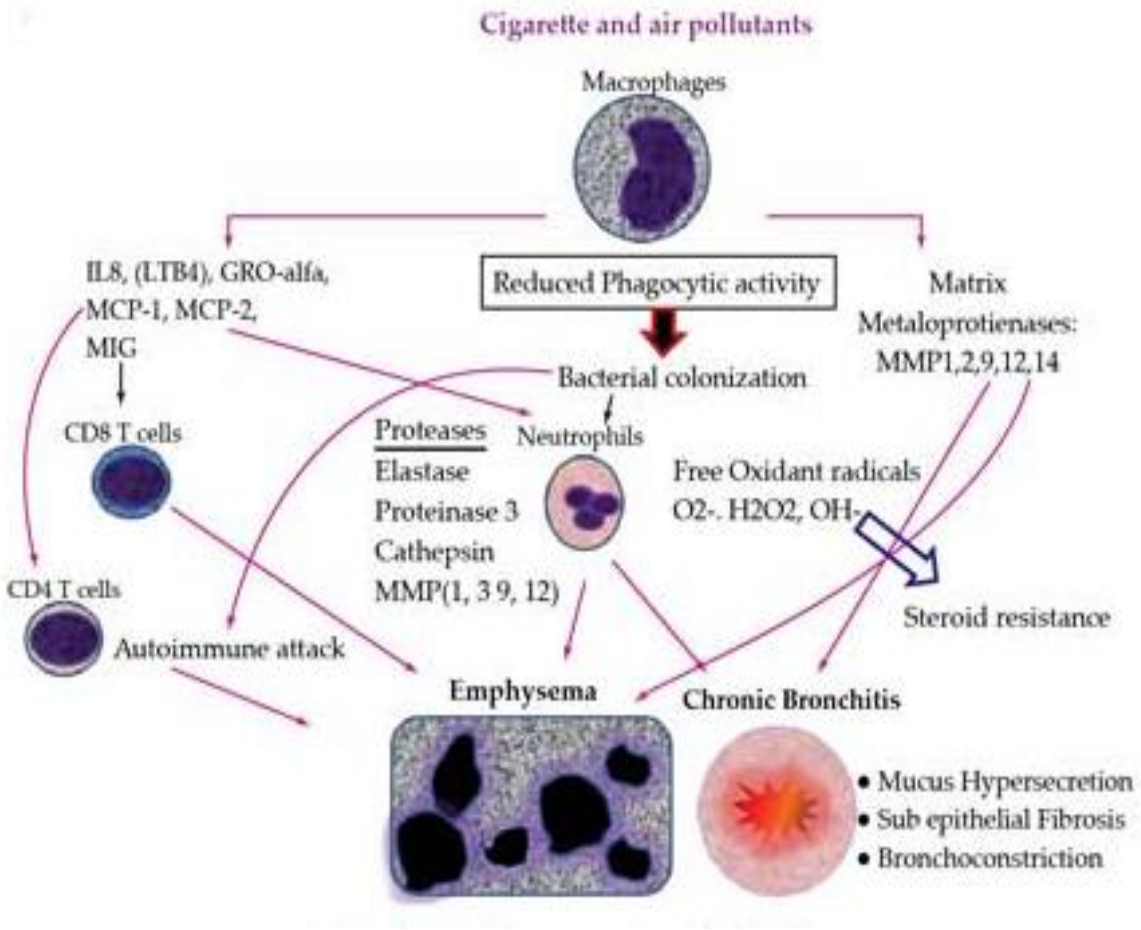
The presence of perpetual inflammation and imbalance of oxidant-antioxidant, leading to oxidative stress are the two non-exclusive mechanisms implicated in the pathogenesis of COPD. The neutrophils, macrophages and lymphocytes are the primarily cells involved in COPD inflammation. A battery of inflammatory mediators, including cytokines, chemokines

and chemoattractants,is released by the inflammatory cells. It perpetuates the inflammation resulting in an uncontrolled cascade. Neutrophils by releasing chemo attractants such as interleukin-8 and leukotriene B4 can further attract neutrophils to the site.[30]

Neutrophils also release proteolytic enzymes such as elastase, proteinase-3, cathepsin G, cathepsin B and matrix metealoproteinases. All these can cause damage to the elastic lung tissue.[31] Cytokines and chemokines such as IL-8, IL-6, IL10 TNFα, LTB4 are released by the macrophages. All these and together with reactive oxygen species can attract and activate various kinds of inflammatory cells and series of proteinases, mostly MMPs(Matrix metalloproteinases) such as MMP-2, MMP-9, MMP-12, MMP-14, with tremendous elastolytic potential and elastinolytic cysteine proteinases such as cathepsin K, L and S.[30]

Destructive enzymes such as perforin and granzyme B are released by the CD8 and lymphocytes. These enzymes have the ability to induce apoptosis of the alveolar epithelial cells, and CD4 Lymphocytes can induce an autoimmune response to the lung tissue. The oxidative stress such as oxidative inactivation of antiproteases and surfactants, mucus hypersecretion, membrane lipid peroxidation, alveolar epithelial injury, remodeling of the extracellular matrix, and apoptosis, reduction in elastin collagen synthesis and fragmentation of the skeletal proteins and steroid-unresponsiveness are associated with the COPD related pathological changes.[32,33]

Figure 1: Pathogenesis of COPD.[30]



f) Complications, morbidity, mortality

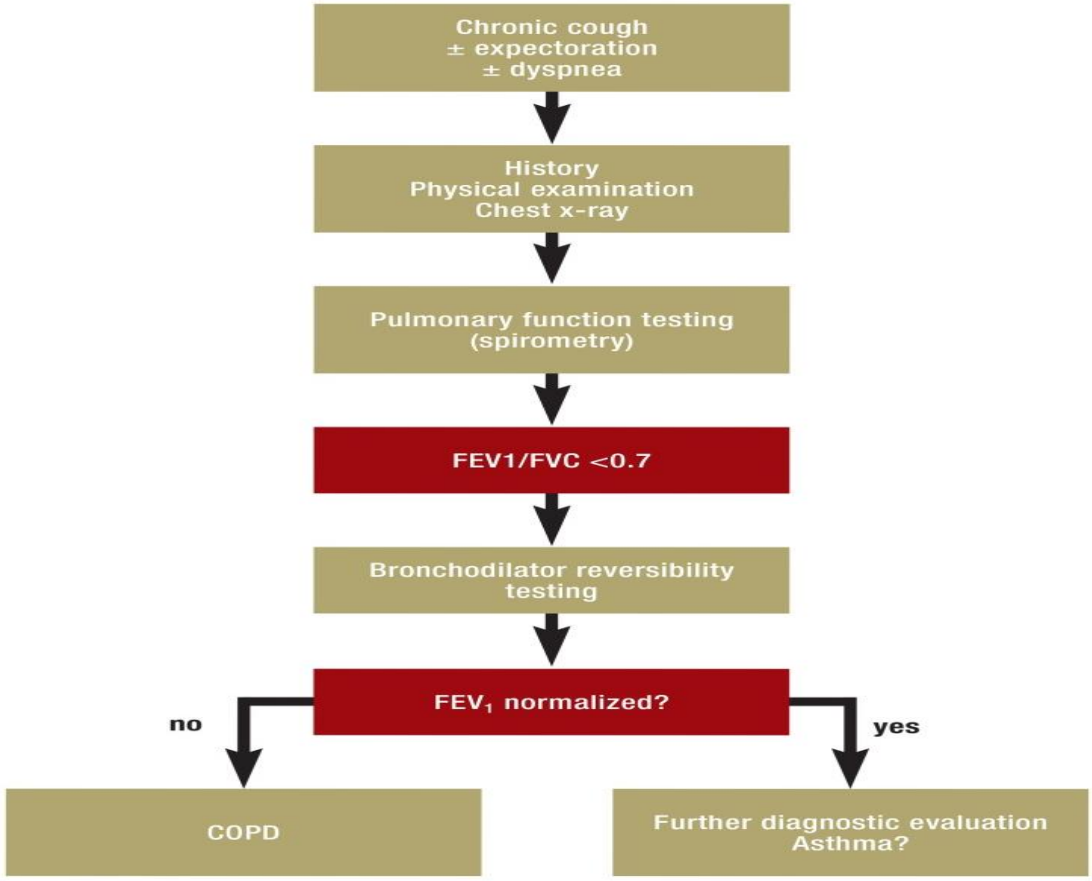
Heart disease, cancer, mental health including depression and anxiety, decreased bone mineral density, musculoskeletal and connective tissue disorders, vascular disorders, gastrointestinal, endocrine or metabolic or nutrition diseases, sleep disorders are the co-morbidities associated with COPD.[7]

Respiratory failure is the leading cause of mortality in patients with very advanced COPD. COPD patients can go into acute, chronic, or acute-on-chronic respiratory failure.[8] The ventilation/perfusion in homogeneities, lung hyperinflation, are the major factor involved in the pathogenesis of hypercapnic respiratory failure.[34]

Globally, COPD causes significant mortality. The fourth leading cause of mortality was COPD in the year 2004, leading to a death of 3 million worldwide. The death rates increased to 4.5 million deaths by the year 2008.[3] By the year 2030, it can reach 5.8 million deaths per year.[3] Over the last 20 years, deaths from COPD have increased, especially in females. The relative risk of mortality from COPD in current smokers is 25.61 for men whereas, 22.35 for women.[7]

g) Diagnosis

Figure 2: Diagnostic algorithm for COPD.[35]



2. PFT in COPD

The gold standard for the diagnosis of COPD is considered to be the pulmonary function tests. Spirometry airflow measures or PFT results are used to measure the severity of COPD. In

normal healthy adults, the ratio of FEV 1 to FVC ranges between 70% and 80%. Respiratory dysfunction, such as that in COPD, is associated with the values of less than 70% of the predicted value. [9]

In patients with COPD, mild COPD is denoted by the predicted $FEV_1/FVC < 70\%$ and $FEV_1 \geq 80\%$ whereas, moderate COPD denoted by predicted $FEV_1 < 80\%$ and severe COPD by predicted $FEV_1 < 50\%$. The predicted $FEV_1 < 30\%$ indicates very severe COPD.[10]

Pulmonary function tests cannot be preferred in patients with general weakness, respiratory problems and non-pulmonary conditions, such as congestive heart failure or neuromuscular disorders.[36,37] Spirometry, lung volumes and diffusing capacity of the lung for carbon monoxide are the three basic components of pulmonary function testing. COPD can affect each of these components.

- **Spirometry**

Forced vital capacity (FVC), forced expiratory volume in one second (FEV_1) and FEV_1/FVC ratio is included in the spirometry. The patient takes the possible biggest breath and blows it out as fast as they can while performing spirometry. During this procedure, FVC is the total volume of air a patient exhales in one breath. Whereas, FEV_1 is the amount of air that the patient can exhale in the first second. Each of it is measured in liters and is presented as a percent of predicted for that patient.

Figure 3: Normal spirometry.[38]

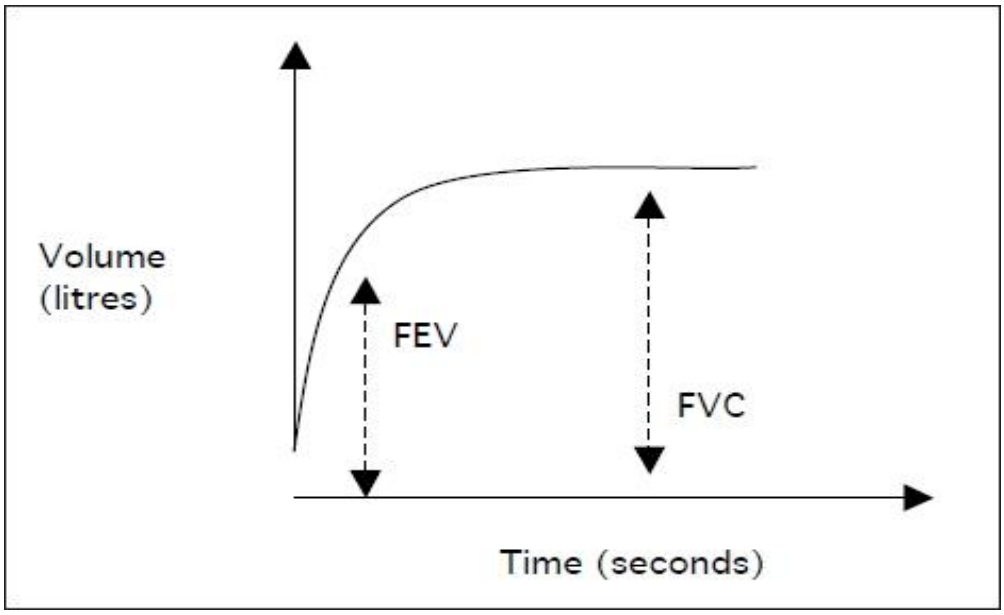
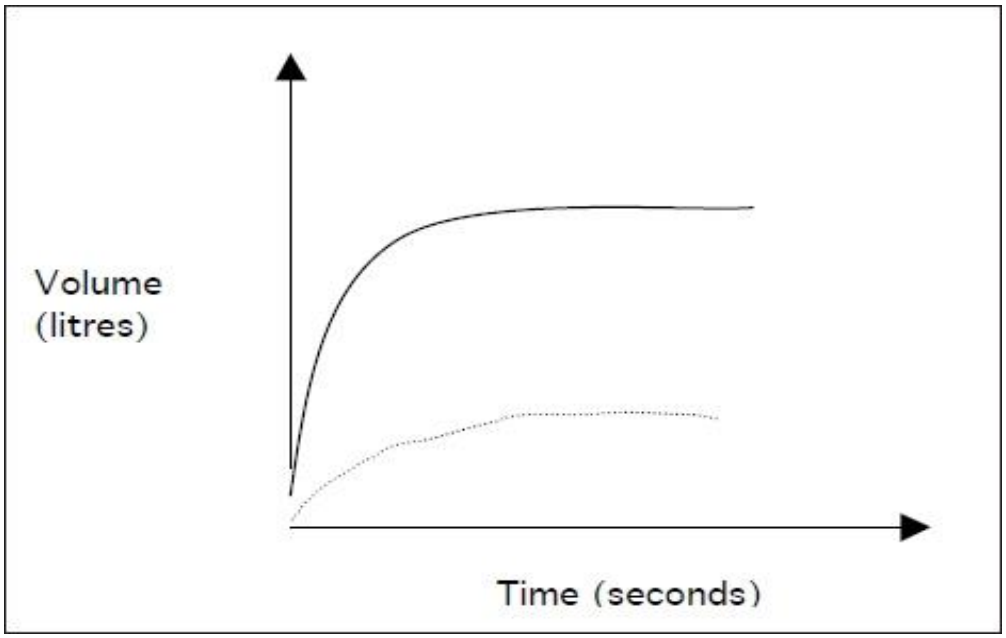


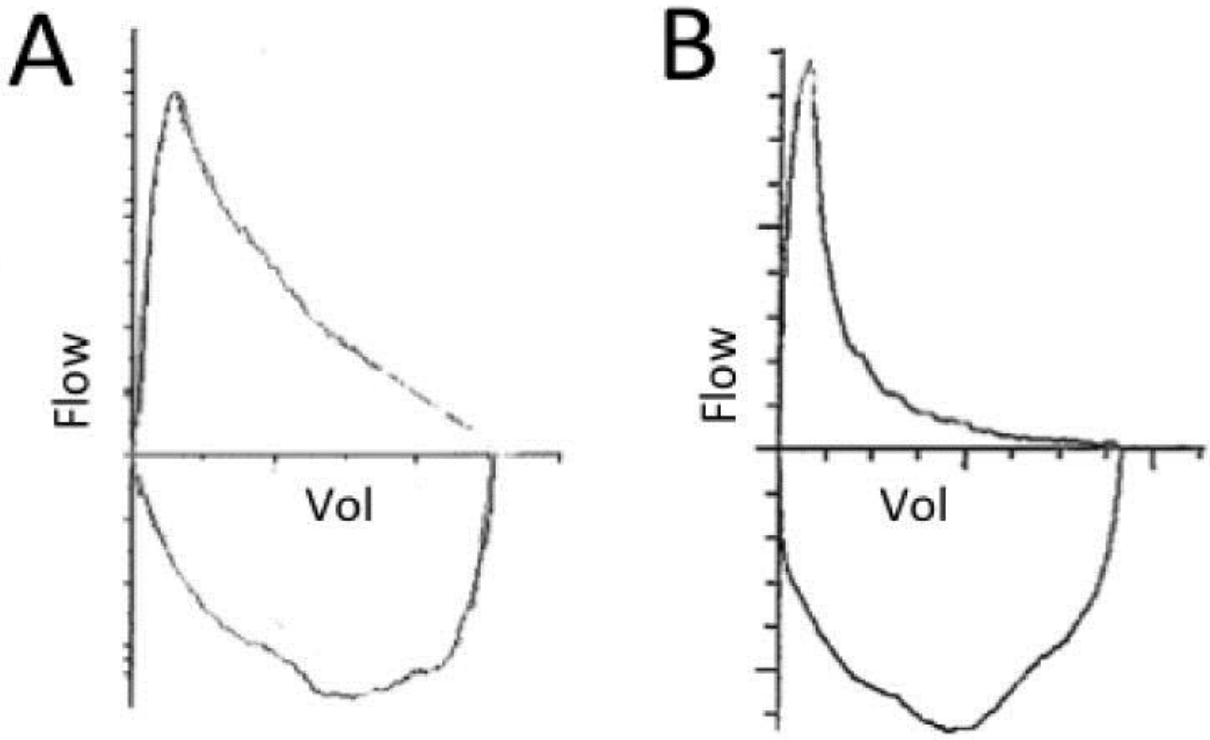
Figure 4: Spirometry in obstructive lung disease.[38]



A narrowing or inflammation of the airways is often present in patients with COPD. It leads to a decrease in FEV_1.A diagnosis of COPD can be made when FEV_1 is decreased disproportionately to the FVC. The FEV_1/FVC ratio is calculated in order to determine if the decrease is disproportionate. A diagnosis of COPD can be considered by an FEV_1/FVC ratio of <0.70 after the use of a bronchodilator.

A flow-volume loop can also be generated along with spirometry. A flow-volume loop plots flow on the y axis whereas, volume on the x-axis. A normal flow-volume loop has a characteristic shape. The expiratory limb takes on a coved shape in obstructive lung disease such as COPD.

Figure 5: A) A normal flow-volume loop. B) A flow-volume loop of a COPD patient showing coving of the expiratory limb.[39]



- **Lung Volumes**

Total lung capacity (TLC), residual volume (RV) and functional residual capacity are included in the lung volumes. The volume of air contained in the lung after a full inhalation is considered as the total lung capacity. Whereas, the volume of air left in the lung after a full exhalation is the residual volume—the volume of gas left in the lungs after a tidal breath is called the functional residual capacity.

Helium dilution, nitrogen washout or body plethysmography are used to measure the lung volumes. Body plethysmography is the gold standard measurement in COPD. Loss of elastic recoil due to the EMPHYSEMA can allow the lungs to stretch to an abnormal large volume. When the disease starts to progress, it can destroy the elastic tethers that help to hold the small airways during exhalation. It leads to the premature closing of the airways. Also causes an abnormal amount of air to be trapped in the lung. The inflammation of the small airways leads to narrowing and can further contribute to air trapping and an increase in RV.

Hyperinflation can be caused due to air trapping. There is a static and dynamic component of hyperinflation. The loss of elastic recoil properties of the lung and fixed airway obstruction can cause static hyperinflation while the dynamic hyperinflation occurs during exercise or times of rapid respiratory rate. The patient is unable to finish exhaling before the next breath starts in such situations. The patient can become progressively more hyperinflated with each breath.

- **Diffusion capacity of the lung for CO(DLCO)**

The measure of how easily carbon monoxide molecules transfer from the alveolar gas to the hemoglobin of the red cells in the pulmonary circulation is the DLCO. The patient inhales a single breath containing a minute amount of Carbon monoxide and holds it for 10 seconds in order to measure the DLCO. The breath is then exhaled, and the exhaled breath is analyzed for Carbon monoxide. The change in the concentration of the Carbon monoxide is then multiplied by the single breath TLC to calculate the DLCO. The DLCO decreases with the increasing severity of COPD.[39]

3. Functional exercise capacity in COPD

The patients with COPD are mainly reported with exercise intolerance and functional impairment. Dynamic hyperinflation, increased respiratory load, poor gas exchange, skeletal muscle dysfunction, age-related frailty, physical de-conditioning, mood disturbance, lack of motivation and comorbidity burden are the contributing factors for the exercise intolerance and functional impairment.

The physiological gold standard method is the cardiopulmonary exercise testing by using a cycle ergometer or treadmill. It is not preferred for routine use in a busy clinic setting as it is time-consuming and also requires specialist equipment and expertise. As compared to cardiopulmonary exercise testing the field walking tests, such as the 6-min walk test, the incremental walk test and endurance shuttle walk test is simpler and cheaper. However, even these tests have some disadvantages such as the 6MWT requires a period of at least 30 m, which is rarely feasible in the patient's home, the acute hospital bedside or the outpatient clinic. Gait speed tests, sit-to-stand tests, step tests and the timed up-and-go test are preferred as an alternative in such patients.[40]

A. 6 MIN WALKING TESTS (6MWT) Della Patrona,2013, Polkey MI2013.

The exercise capacity in patients with COPD can be assessed using the 6 min walk test. The primary outcome measure in 6 min walk test is the distance walked in 6 min. It can be used to evaluate the benefit of pulmonary rehabilitation.[11–13] It is associated with poor health-related quality of life. Hence, it is considered as a potentially useful biomarker in COPD.[14] A 6-minute walk distance <350 m indicates a significant increase in the rate of mortality in patients with COPD.[15]The requirement of space, time and trained staff are the disadvantages of 6MWT.[16]

B. SIT TO STAND TESTS (STS)

The sit-to-stand test is considered as a simple and practical test. It is used to identify the functional capacity in COPD patients. The inability to perform the movements of standing up and sitting down is associated with mortality and with impairment of function and mobility. The 5-repetition STS test is considered as reliable and responsive, whereas, the 1-min protocol is a predictor of mortality in patients with COPD.[16]

The sit-to-stand test can be used to indirectly determine exercise tolerance as well as the lower extremity skeletal muscle function.[15]The requirement of small space, simple equipment (chair and a stopwatch) and feasible in all settings, including the home, busy clinic setting or the acute hospital bedside are the advantages of sit to stand tests.[40]

4. CORRELATION OF 6 MIN WALKING TESTS, SIT TO STAND TESTS AND PULMONARY FUNCTION TEST IN COPD

Vaidya T et al[41], conducted a study in COPD patients in which it was concluded that the 6MWT distance, age, being on long-term oxygen treatment and the Quadriceps maximum voluntary contraction strength(QMVC) were the significant predictors of the number of 1-minute STS repetitions. Also, the improvement of the 1-minute STS repetitions at the end of Pulmonary Rehabilitation was correlated with the change in Quadriceps maximum voluntary contraction strength (QMVC) and 6MWD.

The study results of Beaumont M, et al[42], in 19 COPD patients revealed a correlation between the 6MWD and sit-to-stand repetitions. Both the tests showed different variations of heart rate and pulsed oxygen saturation. Whereas, similar variations were identified with dyspnea and lower limb fatigue.

In Shah H, et al.,[17] study a significant difference was identified in HR, SBP and DBP at the end of both 6MWT and STST. Gurses HN et al[18], conducted a cross-sectional study in COPD patients in which a moderate correlation identified between 30 and 60 seconds STS tests and 6MWT. Whereas, a weak correlation between 10 seconds of STS test and 6MWT. Similarly, a weak correlation identified between borg fatigue scores after 10, 30, and 60 seconds STS tests and fatigue score after 6MWT. While 10, 30, and 60 seconds STS tests were moderately correlated with 6MWT.

In 50 COPD patients, Beaumont M et al[19], performed a study,the heart rate and SpO2 were significantly different at the end of the 6MWT and 3minute Step test (3MStepT). Also, the lower limb fatigue was identified higher after the 3MStepT with 3.4 ± 2.4. Reychler G et a al[20] performed a study in 42 COPD patients in which the STST and 6MWT were identified with good repeatability. Heart rate variations and pulsed O2 saturation for STST and 6MWT were identified significantly different.

Zanini A et al[43], conducted a study in Sixty moderate-to-severe COPD inpatients. The study aimed to compare the peripheral muscle performance of COPD patients by the sit-to-stand test and one-repetition maximum. There was a relationship identified between one-repetition maximum(1-RM), 30-second STST and to 1-minute STST. Perceived fatigue was better tolerated in 30-second STST. The 30-second STST, 1-minute STST, one-repetition maximum(1-RM)and in the 6MWT were observed with significant improvement in the specific strength training group. Whereas, the 30-second STST and "6MWT" showed improvement in the usual Pulmonary rehabilitation(PR) program group. This study concluded that STST is a valid and reliable tool to determine peripheral muscle performance in patients with COPD.

Vaidya T et al[41], conducted a study in COPD patients. The study aimed to evaluate the impact of pulmonary rehabilitation with the 1-minute sit-to-stand test.The 6-minute walk distance, age, being on long-term oxygen treatment and the Quadriceps maximum voluntary contraction strength(QMVC) were the significant predictors of the number of 1-minute STS repetitions. The improvement of the 1-minute STS repetitions at the end of Pulmonary rehabilitation(PR) was correlated with the change in Quadriceps maximum voluntary contraction strength(QMVC) and 6MWD. The study results revealed that 3.8±4.2 was the improvement of the 1-minute STS repetitions at the end of PR. Thereby, the study concluded that the efficiency of PR can be measured through a 1-minute STS test.

Jones SE et al[44], performed a study in 50 patients with COPD. The purpose of the study was to evaluate the reliability, validity and responsiveness of the 5STS in COPD patients. The study results revealed that .97 and 0.99 were the correlation coefficients of test-retest and interobserver intra class. There was a significant correlation identified between 5STS time and Incremental shuttle walk(ISW), Quadriceps maximum voluntary contraction strength(QMVC), St.George's respiratory Questionnaire(SGRQ)and iBODE. The study reported that in patients with COPD 5STS is a reliable and valid tool.

Strassmann A et al[45], performed a cross-sectional study in 6,926 participants. The aim of the study was to identify the reference values for the 1-min sit-to-stand test.The STST was done in 89.3% of the population. The median number of repetitions in young men were 50/min and in young women were 47/min. Whereas, in older men and women with 30/min and 27/min. Through the present study, it was concluded that the reference values help to interpret1-min STS test performance and identification of individuals with decreased lower body muscular strength and endurance.

Canuto F et al[46],conducted a study in 14 patients with moderate to severe COPD. This study compared the neurophysiological effectiveness between the Sit-to-Stand test with the 6-MWT in patients with COPD. The student t-test was used to analyze the results of the blood lactate concentration during rest and after performing functional tasks. The initial and final values of SST showed a significant difference. This study concluded that SST can be used to determine the functional status with respect to neurophysiological effectiveness.

Beaumont M et al[42], conducted a study in 19 COPD patients. The study aimed to compare 6MWT to sit-to-stand test in patients with COPD. The study results revealed a correlation between the 6MWD and sit-to-stand repetitions. Both the tests showed different variations of heart rate and pulse oxygen saturation. Whereas, similar variations were identified with dyspnea and lower limb fatigue. It was concluded that the exercise capacity in COPD patients can be estimated by the sit-to-stand test.

Shah H et al[17], performed a study in patients with COPD. The purpose of the study was to determine the functional status by the STST and the 6MWT in COPD patients. At the end of both SMWT and STST, a significant difference was identified in HR, SBP and DBP. SMWT distance and STST repetitions were observed with a strong correlation. HR, SBP and DBP were significantly correlated at the end of both tests. The study concluded that the STST can be considered as an alternative of SMWT to assess cardiovascular endurance in COPD.

Gurses HN et al[18], conducted a cross-sectional study in 40 participants. The objective of the study was to find the relationship of timed STS tests with a 6-minute walk test in young adults. The mean age of the study participants was 21.7 ± 1.2 years. Using the Borg category-ratio scale rate of fatigue and shortness of breath are measured. There was a moderate

correlation identified between 30- and 60-seconds STS tests and 6MWT. Whereas, a weak correlation between 10 seconds of STS test and 6MWT. Similarly, a weak correlation identified between BORG fatigue scores after 10, 30, and 60 seconds STS tests and fatigue score after 6MWT. While 10, 30, and 60 seconds STS tests were moderately correlated with 6MWT.

Beaumont M et al[19], performed a study in 50 participants. The purpose of the study was to compare 3 min Step test and 6MWT in COPD patients. There was a strong correlation identified 6MWT and 3min Step test(3MStepT). After the 6MWT and 3min Step test(3MStepT), the heart rate and SpO2 were significantly different. Lower limb fatigue was identified higher after the 3min Step test(3MStepT)with 3.4 ± 2.4. The study concluded that the functional exercise capacity in COPD patients can be estimated with 3min Step test(3MStepT).

Gloeckl R et al[47],conducted a study in 26 COPD patients. The study aimed to compare the sensitivity of 2MWT as compared to the 6MWT in detecting exercise-induced oxygen desaturation in COPD patients. The study results revealed that 150 m and 397 m were the average walking distances for the 2MWT and 6MWT. There was no statistical difference identified in minimum O2 saturation during the 2MWT and 6MWT. The study concluded the validity of 2MWT in detecting exercise-induced oxygen desaturation in COPD patients.

Chen H et al[48], conducted a study in 150 patients. This study is conducted to determine the correlation between the 6MWT and spirometry parameters in COPD patients. There was a correlation identified between 6MWD, 6MWORK and spirometry parameters. Similarly, SPO2% was correlated with the dyspnea Borg scale. The predictors of the 6MWD were the

percent of predicted FEV 1 and residual volume to total lung capacity ratio. Whereas, the predictor of the 6MWORK was the maximum voluntary ventilation. The study concluded that 6MWT can be used to monitor changes in pulmonary function in COPD patients.

Fujimoto H et al[49], conducted a retrospective study in COPD patients.The aim of the study was to identify the association of six-minute walk distance with resting pulmonary function in chronic obstructive pulmonary disease patients.There was an association identified between 6MWT and age, weight, BMI, Inspiratory capacity(IC), TLC, IC/TLC, DLCO.The study concluded that age, Inspiratory capacity(IC), and DLCO are the factors associated with 6MWD in COPD patients.

MeriemM et al[50], performed a study in 49 patients. The study is conducted to determine the feasibility of STST for the evaluation of functional status in COPD patients. The study results revealed that 67.06 ± 8.4 years and 46.25% ± 19.64% were the mean age of the participants and the mean FEV1.The cardiorespiratory stress was identified as lower after STST. 6MWT distance was positively correlated with forced vital capacity. There was a negative correlation identified between 6MWT, dyspnea severity at baseline and BODE index. Through the present study, it was concluded that STST can be used to determine functional status during COPD.

Reychler G et al[20], performed a study in 42 COPD patients. This study aimed to determine the functional exercise performance by sit-to-stand test and 6MWT in patients with COPD. There was a correlation observed between the sit-to-stand repetitions and 6MWD. STST and 6MWT were identified with good repeatability. Variations of heart rate and pulsed oxygen saturation for STST and 6MWT were identified significantly different. The study reported that the

functional exercise performance in patients with the COPD can be estimated by one-minute sit-to-stand test effectively.

Vaidya T et al[51], conducted a study in COPD patients. This study aimed to identify the STST modality in patients with COPD. There was a good correlation identified between STST performances, the results reported in other functional tests, quality of life scores and prognostic index. Through the present study, it was concluded that these tests are easy to use in a home environment, with excellent metrological properties and responsiveness to pulmonary rehabilitation.

WaatevikM et al[52], performed a cohort study in 370 participants. The study was conducted to determine the predictors of all outcomes of 6MWT in COPD patients. Gender, age, FEV_1 in% predicted, symptoms of dyspnea, co-morbidities and self-reported physical activity for walking distance, FEV_1 in% predicted, and PaO_2 for oxygen desaturation and body composition, smoking and co-morbidities for self-perceived dyspnea assessed by the Borg scale were the significant predictors identified in the multivariate analyses. The study concluded that the characteristics of COPD are more strongly related to specific 6MWT outcomes.

Zhang Q et al[15], performed a study in 128 participants.This study aimed to compare the five-repetition sit-to-stand test with the 30-second sit-to-stand test for predicting poor performance in the six-minute walking test. There was a moderate correlation identified between 6MWT, 5STS and between 6MWT and 30STS. Similarly, Quadriceps muscle strength(QMS) was moderately correlated with 5STS and 30STS. The sensitivity, specificity and positive and negative predictive values of 5STS for predicting poor 6MWT performance were 76.0%,

62.8%, 56.7%, 80.3% and 62.0%. Whereas, for 30STS were 62.0%, 75.0%, 62.0% and 75.0% respectively. The study concluded that 5STS and 30STS are similar in terms of sensitivity and specificity.

COPD predictability with 6MWT:

Rehman et al[53],conducted an analytical cross-sectional study to determine the correlation of sit to stand the test with a 6-minute walk test in patients with chronic obstructive pulmonary disease. The STST and 6MW Test was performed and compared with each other and with the COPD Assessment Test (CAT).On applying the Correlation coefficient test, a moderate positive correlation was found between Sit to stand the test and 6-minute walk test distance ($r=0.71$, $p=0.0005$). A mild positive correlation was also found in these patients between the Sit to stand the test and chronic obstructive pulmonary disease Assessment Test score (STST and CAT $r=0.46$, $p=0.011$). Similarly, a moderate positive correlation was found between the 6-minute walk test distance and chronic obstructive pulmonary disease Assessment Test score ($r=0.58$, $p=0.001$). The study concluded that in COPD patients, the functional capacity can be assessed through STST instead of 6 MW Test having the same results.

van Gestel et al[54], conducted a study to evaluate whether PA can be estimated by simple tests commonly used in clinical practice in patients with COPD.Univariate and multivariate analyses were used to examine the relationship between the 6-minute walking distance (6MWD), the number of stands in the Sit-to-Stand Test (STST), hand-grip strength and the total energy expenditure as assessed by the Zutphen Physical Activity Questionnaire (TEEZPAQ).In 70 patients with COPD (21 females) with a mean [SD] FEV1 of 43.0 [22.0] %predicted, PA was found to be significantly and independently associated with the 6MWD ($r=0.69$, 95% CI 0.54 to 0.80, $p<0.001$), STST ($r=0.51$, 95% CI 0.31 to 0.66, $p=0.001$) and

TEEZPAQ (r=0.50, 95% CI 0.30 to 0.66, p<0.001) but not with hand-grip strength. The ROC curve analysis in this study implied that these tests cannot be used to reliably identify patients with an extremely inactive lifestyle.

Zanini et al[43]**,** conducted a study to assess the peripheral muscle performance of COPD patients by the sit-to-stand test (STST), as compared to the one-repetition maximum (1-RM), considered as the gold standard for assessing muscle strength in non-laboratory situations and to evaluate the responsiveness of STST to a Pulmonary rehabilitation (PR)program. Patients were assessed on a 30-second STST and 1-minute STST, 1-RM, and 6-minute walking test (6MWT), before and after PR. In all patients, 1-RM was significantly related to the 30-second STST (r=0.48, P,0.001) and to 1-minute STST (r=0.36, P=0.005). The 30-second STST was better tolerated in terms of the perceived fatigue (P=0.002) and less time consuming (P,0.001) test. In the specific strength training group, significant improvements were observed in the 30-second STST (P,0.001), 1-minute STST (P=0.005), 1-RM (P,0.001), and in the 6MWT (P=0.001). In the usual PR program group, there was good improvement in the 30-second STST (P=0.042) and in the 6MWT (P=0.001). The study shows that in stable moderate-to-severe inpatients with COPD, STST is a valid and reliable tool to assess peripheral muscle performance of lower limbs, and is sensitive to a specific PR program.

Meena et al[55]**,**conducted a prospective cross-sectional study to find the correlation of 6MWT with spirometric and radiological findings in COPD patients.Correlation between 6MWT and Spirometer parameters: The mean 6MWT covered was 238.6 ± 85.99 meters (range 88-500 m) and correlated positively to all spirometer parameters post FVC% predicted (r=0.6290; p< 0.0001) & post FEV1/FVC % predicted (r=0.4394; p < 0.0001). The mean value of six-minute walk distance (6MWT) was 374.7±66.86 in stage I COPD, 265.9±51.88 in stage II,

198.7±63.03 in stage III & 150.5±150.2 in stage IV, which were statistically significant (P <0.0001). Along with physiological parameters, 6MWT can be used to assess the lung function in COPD cases, where spirometer is not available. In conclusion, in COPD cases, 6MWT is a useful test to assess the severity of the disease.

Hajare et al[56]**,** conducted a cross-sectional study aiming to find the correlation of 6MWT with spirometry in COPD patients. The study noted a strong positive correlation between percent predicted 6MWD and FEV1 (r=0.850 and p=<0.001). There was a moderate correlation between percent predicted 6MWD and FVC (r=0.554 and p=<0.001). The spirometry parameters (FEV1, FVC, FEV1/FVC) correlated significantly with percent predicted 6MWD. The study concluded that 6MWT can be a useful replacement of spirometry in the assessment of the severity of COPD.

LACUNAE OF LITERATURE

The five-repetition sit-to-stand test is a test of lower limb function that measures the fastest time taken to stand five times from a chair with arms folded. The 5STS has been validated in healthy community-dwelling adults, but data are lacking in chronic obstructive pulmonary disease populations. The Sit-to-Stand test is accepted and utilized during functional assessments of COPD patients, along with the 6-Minute Walk Test. But there is a lack of evidence in the literature regarding the neurophysiological effectiveness of SST compared to 6MWT. The 6MWT is a well-known filed walking, and the two-minute walk test is less well-validated than 6MWT in patients with chronic obstructive pulmonary diseases. The relationship between the 6-minute walk test and pulmonary function test in stable chronic obstructive pulmonary disease remains limited in data.

MATERIALS & METHODS

MATERIALS AND METHODS:

Study site: This study was conducted in the department of General Medicine at SRI DEVRAJ URS MEDICAL COLLEGE, TAMAKA, KOLAR

Study population: All cases of COPD diagnosed using GOLD 2018 Criteria attending outpatient/ inpatient, RLJ Hospital, Tamaka, form the subject for the study were considered as the study population.

Study design: The current study was a cross-sectional study

Sample size: 118

Considering sample size Sample correlation coefficient = .6
Population correlation coefficient = .5
Power (%) = 80
Alpha Error (%) = 5
Sided = 2
Required sample size = 72

Alpha Error(%)	Power(%)	Sample Size(n)
5	80	118

Sampling method: All the eligible subjects were recruited into the study consecutively by convenient sampling till the sample size is reached.

Study duration: The data collection for the study was done between January 2019 to June 2020

Inclusion Criteria:

- Patients(aged>40years) with COPD as defined by GOLD 2018 criteria (FEV1/FVC<0.7).
- Clinically Stable patient who is free of acute exacerbations.

Exclusion criteria:

- Patients with ischemic heart disease/ left heart failure.
- Patients with resting heart rate>120 bpm and Patients with systolic BP>180 and diastolic BP>120.[9]
- Patients with neurological, musculoskeletal and peripheral vascular disease in lower extremities.
- Patients with Anemia, asthma, pneumonia, lung cancer, tuberculosis, Asthma COPD overlap syndrome and other respiratory illness limiting patient's movements.

Ethical considerations: Study was approved by the institutional human ethics committee. Informed written consent was obtained from all the study participants, and only those participants willing to sign the informed consent were included in the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. Confidentiality of the study participants was maintained.

Data collection tools: All the relevant parameters were documented in a structured study proforma.

Methodology:

A clinical diagnosis of COPD was considered in any patient with progressive exertional dyspnea, chronic cough and sputum production and history of exposure to risk factors.After taking informed consent, a thorough history is taken, physical examination and investigations are done to rule out exclusion criteria and detect other comorbidities.Then, the selected patients who satisfy inclusion criteria, undergo pulmonary function test(spirometry). An FEV1/FVC ratio was taken. FEV1/FVC< 0.7 is required to make a diagnosis of COPD, and patients are classified according to GOLD 2018 criteria.

Table 2: COPD severity by GOLD 2018 criteria

Patients with FEV1/FVC < 0.70		
GOLD1	Mild	FEV1 >80 % predicted
GOLD2	Moderate	50% < FEV1 <80% predicted
GOLD3	Severe	30% < FEV1 < 50% predicted
GOLD4	Very Severe	FEV1 < 30% predicted

COPD patients will undergo spirometry, STST and a 6-minute walk test.

Age, gender, weight and height of patients noted.

Spirometry done according to GOLD 2018 guidelines. FEV1, FVC, FEV1/FVC and PEFR are noted.

The 6-minute walk test:

It is done according to American Thoracic Society (ATS) guidelines 2002. Before performing the test Heart rate, BP, SpO2, dyspnea and fatigue (according to borg scale) will be noted. 6MWT was performed in a hospital corridor. The walking course was 30m in length. The turnaround points were marked with a cone (some object). The patient was attempting to cover as much distance as possible in the allotted 6-min without supplementary oxygen. The subject should rest for at least 15 minutes before beginning the 6MWT. Distance travelled was recorded using standardized encouragement strategy. None of the patients was allowed to use a walking aid during the test

Table 3: Borg dyspnoea scale.

0	Nothing at all
0.5	Very, very slight (just noticeable)
1	Very Slight
2	Slight
3	Moderate
4	Somewhat Severe
5	Severe
6	Very Severe
7	Extremely Severe
8	Maximal

Distance predicted in metres:

In male patients:

6MWD in metres= (7.57 x height in cm) -(5.02x age) -(1.76x weight in kg)-309

Lower limit of normal= 6MWD-153

In Female patients:

6MWD in metres= (2.11 x height in cm) -(2.29x age) -(5.78x weight in kg) +667

Lower limit of normal= 6MWD-153

Data obtain will be noted. Deviation from expected value will be calculated and compare to look for any association between 6MWD,6MWW and PFT parameters

Sit to stand the test:

A standard chair (height 46 cm) with no arm supports was used. Initial Dyspnea, SPO2, BP, HR are measured. Patients will be instructed to stand up from and sit down on the chair with no support from the hands, repeating the procedure as many times as possible for the duration of 1min at a patient defined pace. The number of stands during 1min will be determined manually.Post-procedure Dyspnea,SpO2,BP,HR are measured

Table 4: Reference range for sit to stand test.[45]

Age group(years)	MEN	WOMEN
40-44	45	41
45-49	44	41
50-54	42	39
55-59	41	36
60-64	37	34
65-69	35	33
70-74	32	30
75-79	30	27

Statistical methods:

Severe COPED Spirometry, Six-minute walk distance and sit to stand test was considered as the primary outcome variable. Demographic parameter, Age, gender, anthropometric parameter like (weight, height BMI), risk factor-like (hypertension, type 2 diabetic mellitus, smoker), pulmonary function test, stage, chest X-ray and 2D echo were considered as other study relevant variable.

Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables.

The association between explanatory variables and categorical outcomes was assessed by cross tabulation and comparison of percentages. Chi square test was used to test statistical significance. Data was also represented using appropriate diagrams like a bar diagram, pie diagram and staked bar diagram.

The predictability of six-minute walk distance and sit to stand test was assessed by Receiver Operative curve (ROC) analysis. The area under the ROC curve along with its 95% CI and p value are presented. Basing on the ROC analysis, it was decided to consider 332.49,332.50 and 15.49,15.50 as the cut off values. The sensitivity, specificity, predictive values and diagnostic accuracy of the screening test with the decided cut off values along with their 95% CI were presented.

P value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.[57]

OBSERVATIONS AND RESULTS

RESULTS:

A total of 118 subjects were included in the final analysis.

Table 5: Descriptive analysis of age in the study population (N=118)

Parameter	Mean ± SD	Minimum	Maximum
Age	64.09 ± 8.31	40.00	75.00

The mean age was 64.09 ± 8.31 years and ranged between was 40 to 75 years in the study population.(Table 5)

Table 6: Descriptive analysis of gender in the study population (N=118)

Gender	Frequency	Percentages
Male	112	94.9%
Female	6	5.1%

Among the study population, 112(94.9%) participants were male and remaining 6(5.1%) participants were female. (Table 6&Figure 6)

Figure 6: Bar chart of gender in the study population (N=118)

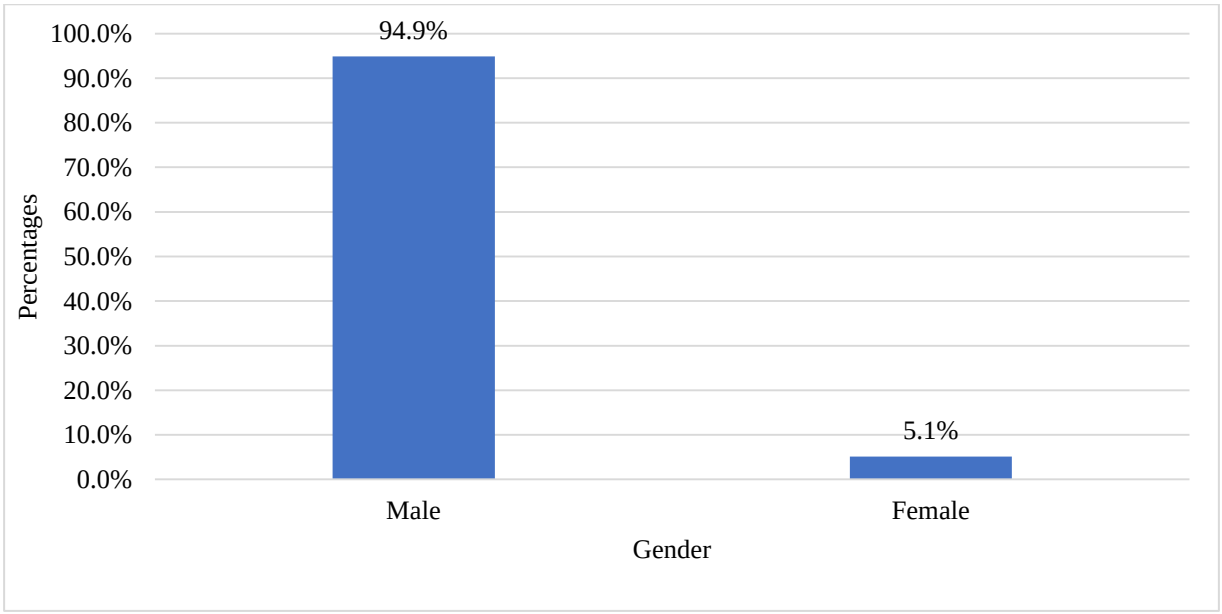


Table 7: Descriptive analysis of anthropometric in study population(N=118)

Anthropometric Parameter	Mean ± SD	Minimum	Maximum
Height(cm)	172.37 ± 5.03	160.0	181.0
Weight (kg)	65.58 ± 5.84	55.0	77.0
BMI (kg/cm2)	22.12 ± 1.85	18.5	26.2

The mean height was 172.37 ± 5.03 cm and ranged between was 160 to 181 cm in the study population. The mean weight was 65.58 ± 5.84 kg and ranged between was 55 to 77 kg in the study population. The mean BMI was 22.12 ± 1.85 (kg/cm2) and ranged between 18.5 to 26.2(kg/cm2) in the ranged between study population. (Table 7)

Table 8: Descriptive analysis of risk factors in the study population (N=118)

Risk factor	Frequency	Percentages
Hypertension	25	21.2%
Type 2 diabetic mellitus	21	17.8%
Smoker	109	92.4%

Among the people with risk factors, the majority of 92.4% of participants were smokers, followed by 21.2% of participants had hypertension, and 17.8% of participants had type 2 diabetic mellitus. (Table 8 & Figure 7)

Figure 7: Bar chart of risk factor in the study population (N=118)

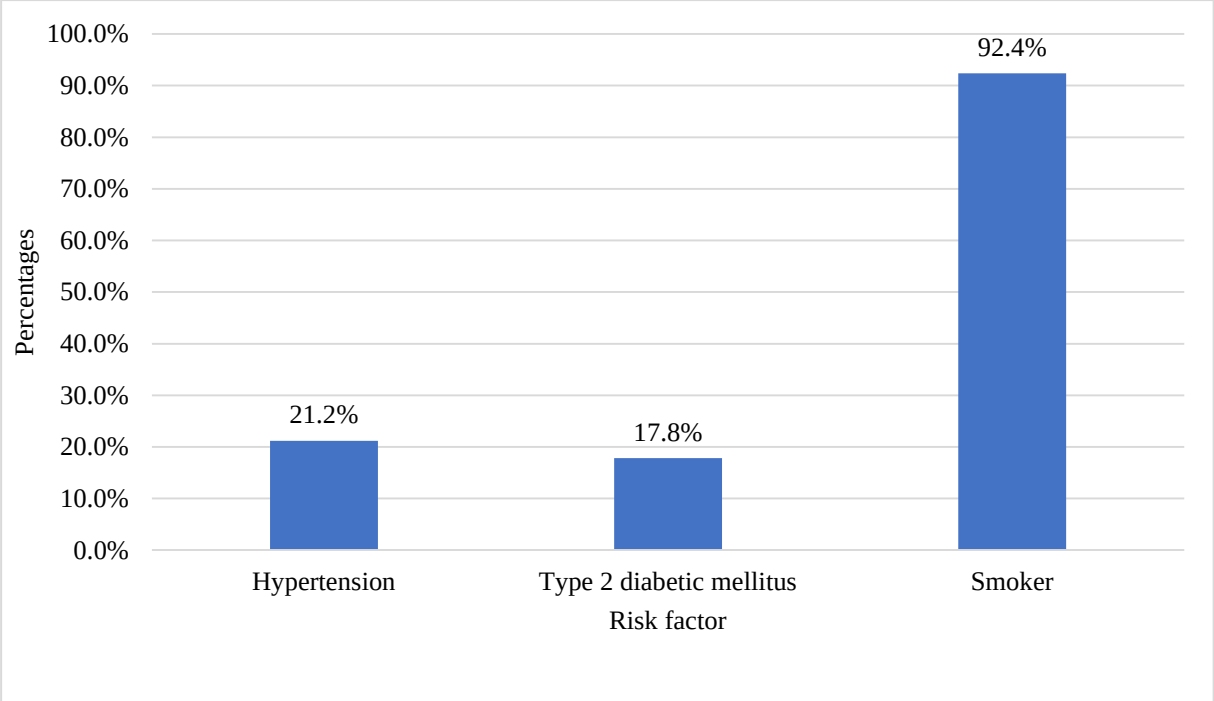


Table 9: Descriptive analysis of pulmonary function test parameters in the study population (N=118)

Pulmonary function test.	Mean ± SD	Minimum	Maximum
Post Fev1	47.48 ± 16.14	10.0	94.0
Post Fev1/Fvc	57.91 ± 12.88	0.5	86.3

The mean pulmonary function test post-fev1 was 47.48 ± 16.14 and ranged between was 10 to 94 in the study population. The mean pulmonary function test post-fev1 was 57.91 ± 12.88 and ranged between was 0.5 to 86.3in the study population. (Table 9)

Table 10: Descriptive analysis of pulmonary function tests stage, severe COPD spirometry in the study population (N=118)

Pulmonary function tests Stage	Frequency	Percentages
Mild	6	5.08%
Moderate	47	39.83%
Severe	54	45.76%
Very severe	11	9.32%
Severe COPD Spirometry		
Mild/ Moderate	53	44.91%
Severe/ Very severe	65	55.08%

Among the people with pulmonary function stages, 6 (5.08%) participants had mild, 47 (39.83%) participants had moderate, 54(45.76%) participants had severe, and 11(9.32%) participants had very severe. Among people with severe COPD spirometry, 53 (44.91%) participants had mild/moderate and remaining 65 (55.08%) participants had severe/very severe. (Table 10&Figure 8 and 9)

Figure 8: Bar chart of pulmonary function test stage in the study population (N=118)

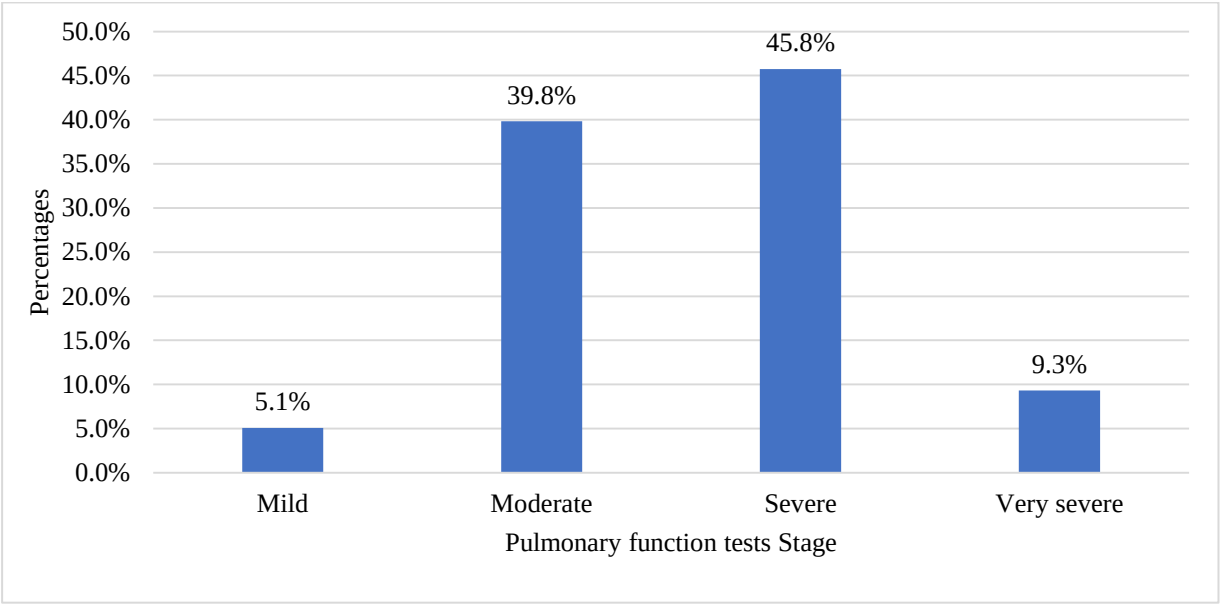


Figure 9: Bar chart of severe COPD spirometry in the study population (N=118)

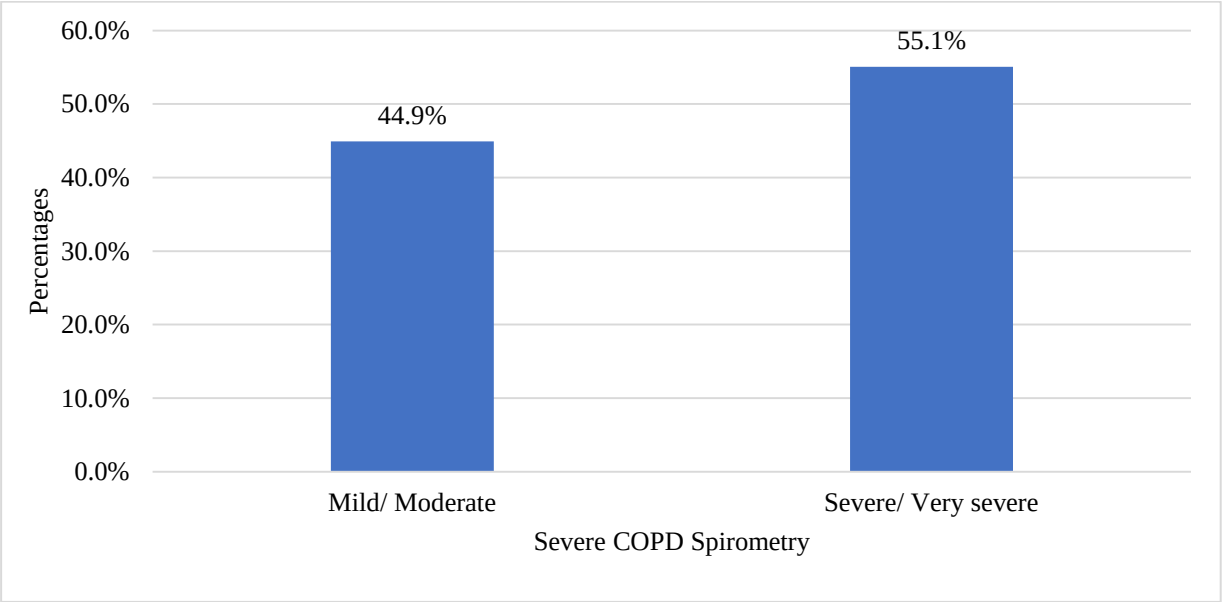


Table 11: Descriptive analysis of six-minute wake distance in the study population (N=118)

Parameter	Mean ± SD	Minimum	Maximum
6 Minute Walk Distance	332.54 ± 67.03	170.0	450.0
Heart Rate (Beats/Min) Pre	72.6 ± 6.36	60.0	90.0
Heart Rate (Beats/Min) Post	77.95 ± 7.59	64.0	100.0
Blood Pressure Pre	130.73 ± 7.61	110.0	150.0
Blood Pressure Post	136.19 ± 8.27	110.0	160.0
Spo2 Pre	93.98 ± 0.82	93.0	96.0
Spo2 Post	91.75 ± 1.39	90.0	94.0
Bode'S Index pre	1.47 ± 0.68	0.0	3.0
Bode'S Index Post	2.47 ± 0.67	1.0	4.0

The mean six-minute walk distance was 332.54 ± 67.03 min and ranged between was 170 to 450 min in the study population. The mean heart rate pre was 72.6 ± 6.36 beats/min and ranged between was 60 to 90 beats/min in the study population. The mean heart rate post was 77.95 ± 7.59 beats/min and ranged between was 64 to 100bt/min in the study population. The mean blood pressure pre was 130.73 ± 7.61 (mm hg) and ranged between was 110 to 150

(mm hg) in the study population. The mean blood pressure post was 136.19 ± 8.27 (mm hg) and ranged between was 110 to 160 (mm hg) in the study population. The mean spo2 pre was 93.98 ± 0.82 and ranged between was 93 to 96 in the study population. The mean spo2 post was 91.75 ± 1.39 and ranged between was 90 to 94 in the study population. The mean BODE`s index pre was 1.47 ± 0.68 and ranged between was 0 to 3 in the study population. The mean BODE'S index post was 2.47 ± 0.67 ranged between was 1 to 4 in the study population. (Table 11)

Table 12: Descriptive analysis of sit to stand the test in the study population (N=118)

Parameter	Mean ± SD	Minimum	Maximum
Sit to Stand Test	15.03 ± 2.41	10.0	22.0
Heart Rate (Beats/Min) Pre	72.6 ± 6.36	60.0	90.0
Heart Rate (Beats/Min) Post	77.95 ± 7.59	64.0	100.0
Blood Pressure Pre	130.73 ± 7.61	110.0	150.0
Blood Pressure Post	136.19 ± 8.27	110.0	160.0
Spo2 Pre	93.98 ± 0.82	93.0	96.0
Spo2 Post	91.75 ± 1.39	90.0	94.0
Bode'S Index Pre	1.47 ± 0.68	0.0	3.0
Bode'S Index Post	2.47 ± 0.68	1.0	4.0

The mean sits to stand test was 15.03 ± 2.41min and ranged between was 10 to 22min in the study population. The mean heart rate pre was 72.6 ± 6.36 beats/min and ranged between was 60 to 90 beats/min in the study population. The mean heart rate post was 77.95 ± 7.59 beats/min and ranged between was 64 to 100bt/min in the study population. The mean blood pressure pre was 130.73 ± 7.61 (mm hg) and ranged between was 110 to 150 (mm hg) in the study population. The mean blood pressure post was 136.19 ± 8.27 (mm hg) and ranged between was 110 to 160 (mm hg) in the study population. The mean spo2 pre was 93.98 ±

0.82 and ranged between was 93 to 96 in the study population. The mean spo2 post was 91.75 ± 1.39 and ranged between was 90 to 94 in the study population. The mean BODE`s index pre was 1.47 ± 0.68 and ranged between was 0 to 3 in the study population. The mean BODE'S index post was 2.47 ± 0.67 ranged between was 1 to 4 in the study population. (Table 12)

Table 13: Descriptive analysis of chest x-ray in the study population (N=118)

Chest X-Ray	Frequency	Percentages
Normal	65	55.1%
EMPHYSEMA	53	44.9%

Among the study population,65(55.1%) participants had normal, and 53(44.9%) participants had EMPHYSEMA. (Table 13 &Figure 10)

Figure 10: Bar chart of chest x-ray in the study population (N=118)

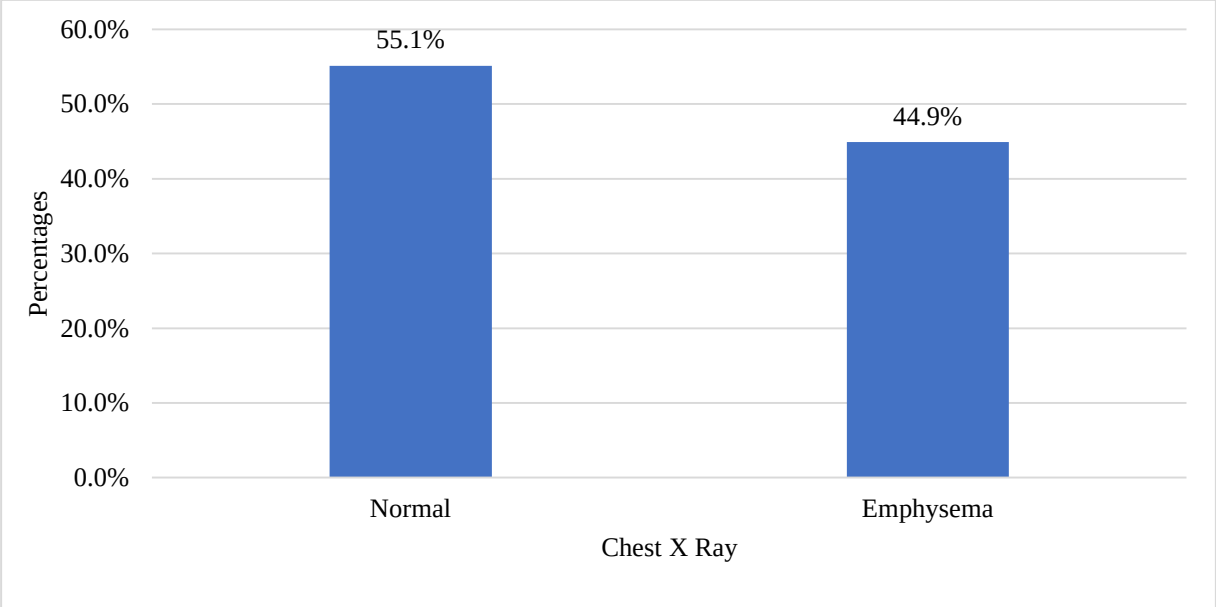
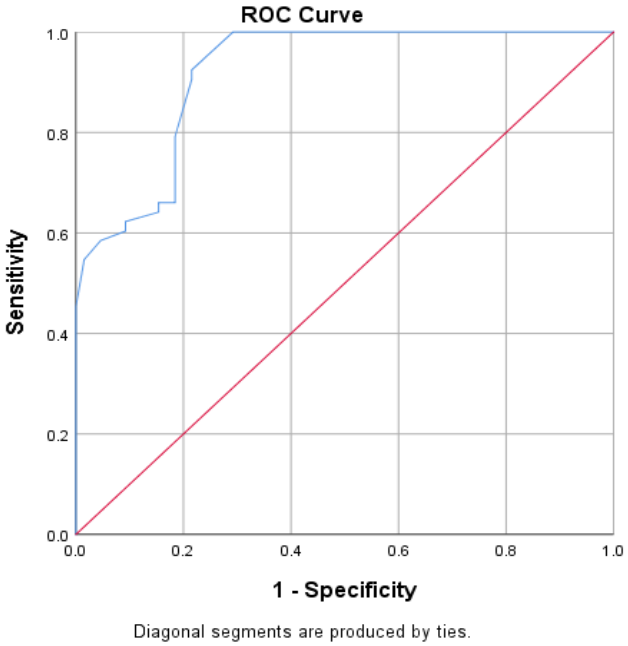


Figure 11: Predictive validity of 6-minute walk distance in predicting severe COPD spirometry (ROC analysis)



Test Result Variable(s): 6-minute walk distance				
Area Under the Curve	Std. Error	95% Confidence Interval of AUC		P value
		Lower Bound	Upper Bound	<0.001
0.920	0.023	0.874	0.966	

The 6-minute walk distance had good predictive validity in predicting severe COPD spirometry as indicated by the area under the curve of 0.920 (95% CI 0.874 to 0.966, P value <0.001). (Figure 11)

Table 14: Comparison of severe COPD spirometry with 6-minute walk distance (N=118)

6 Minute Walk Distance	severe COPD Spirometry		Chi square	P value
	Severe/Very Severe (N=65)	Mild/Moderate (N=53)		
Low (<332.49)	53 (81.54%)	11 (20.75%)	43.458	**<0.001**
High (>=332.50)	12 (18.46%)	42 (79.25%)		

Among the people with severe/very severe group,53 (81.54%) people had low (<332.49) and 12 (18.46%) people had High (>=332.50). Among the people with mild/moderate group,11 (20.75%) people had low (<332.49) and 42 (79.25%) people had high (>=332.50). The difference in the proportion of 6-minute walk distance between severe COPD spirometry was statistically significant (p value <0.001). (Table 14&Figure 12)

Figure 12: Cluster bar chart of severe COPD spirometry with 6-minute walk distance (N=118)

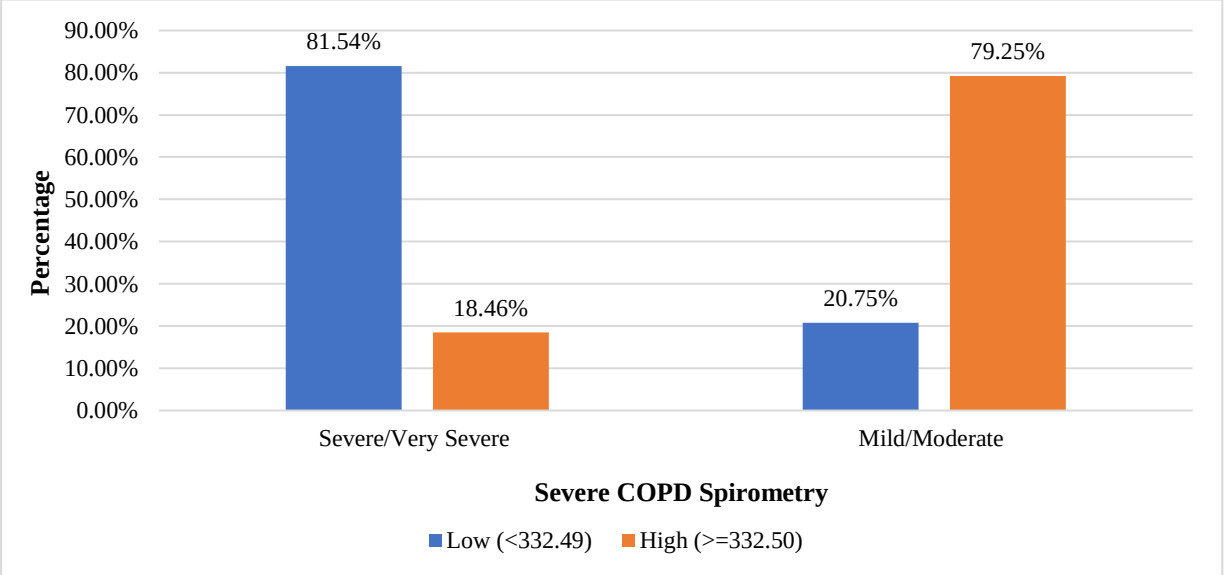
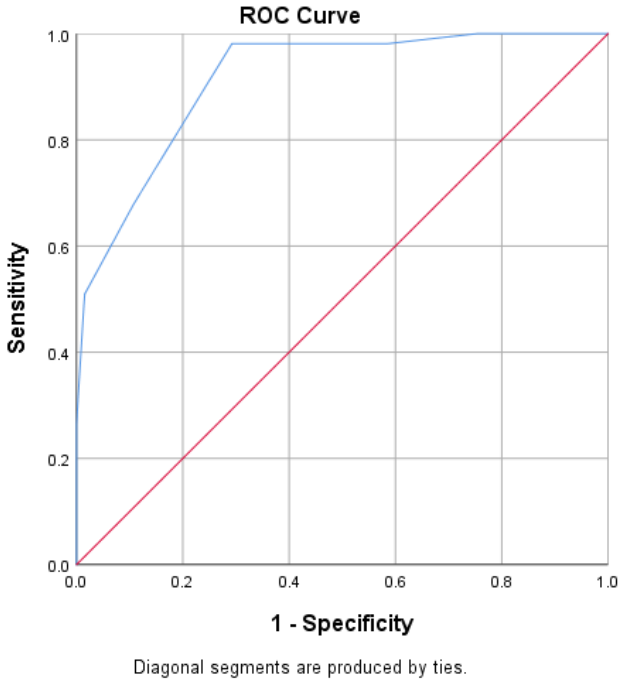


Table 15: Predictive validity of 6-minute walk distance in predicting severe COPD spirometry (N=118)

Parameter	Value	95% CI	
		Lower	Upper
Sensitivity	81.54%	69.97%	90.08%
Specificity	79.25%	65.89%	89.16%
False positive rate	20.75%	10.84%	34.11%
False negative rate	18.46%	9.92%	30.03%
Positive predictive value	82.81%	71.32%	91.10%
Negative predictive value	77.78%	64.40%	87.96%
Diagnostic accuracy	80.51%	72.20%	87.22%

The 6-minute walk distance had sensitivity of 81.54% (95% CI 69.97% to 90.08%) in predicting severe COPD spirometry. specificity was 79.25% (95% CI 65.89%to 89.16%), false positive rate was 20.75% (95% CI 10.84% to 34.11%), false negative rate was 18.46% (95% CI 9.92% to 30.03%), positive predictive value was 82.81% (95% CI 71.32% to 91.10%), negative predictive value was 77.78% (95% CI 64.40% to 87.96%), and the total diagnostic accuracy was 80.51% (95% CI 72.20% to 87.2%). (Table 15)

Figure 13: Predictive validity of sit to stand the test in predicting severe COPD spirometry (ROC analysis)



Test Result Variable(s): sit to stand the test				
Area Under the Curve	Std. Error	95% Confidence Interval of AUC		P value
		Lower Bound	Upper Bound	<0.001
0.915	0.025	0.866	0.963	

The sit to stand test had good predictive validity in predicting sever COPD spirometry as indicated by the area under the curve of 0.915 (95% CI 0.866 to 0.963, P value <0.001). (Figure 13)

Table 16: Comparison of severe COPD spirometry with Sit to stand test (N=118)

Sit to Stand Test	**severe COPD Spirometry**		**Chi square**	**P value**
	Severe/Very Severe (N=65)	**Mild/Moderate (N=53)**		
Low (<15.49)	58 (89.23%)	17 (32.08%)	41.177	**<0.001**
High (>=15.50)	7 (10.77%)	36 (67.92%)		

Among the people with severe/very severe group,58 (89.23%) people had low (<15.49) and 7 (10.77%) people had High (>=15.50). Among the people with mild/moderate group,17 (32.08%) people had low (<15.49) and 36 (67.92%) people had high (>=15.50). the difference

in the proportion of sit to stand test between severe COPD spirometry was statistically significant (p value <0.001) (Table 16&Figure 14)

Figure 14: Cluster bar chart of severe COPD spirometry with Sit to stand test (N=118)

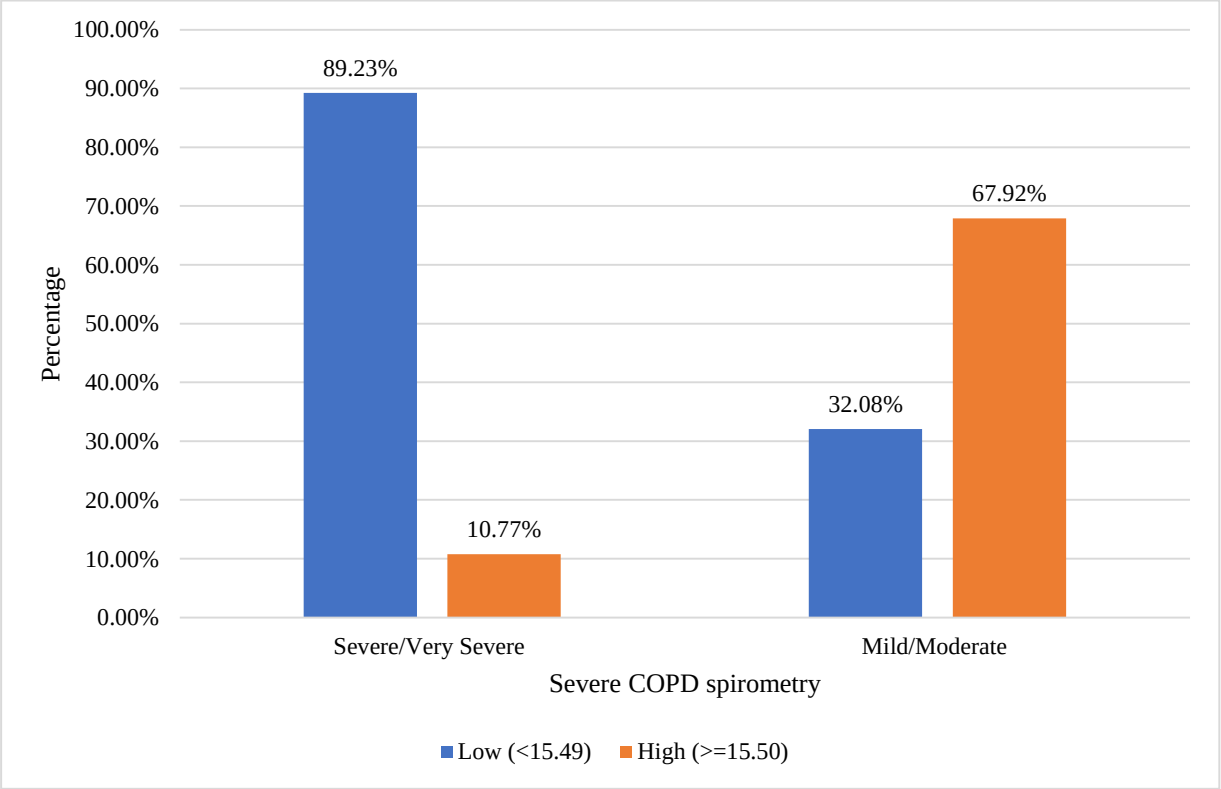


Table 17: Predictive validity of Sit to stand the test in predicting severe COPD spirometry (N=118)

Parameter	Value	95% CI	
		Lower	Upper
Sensitivity	89.23%	79.06%	95.56%
Specificity	67.92%	53.68%	80.08%
False positive rate	32.08%	19.92%	46.32%
False negative rate	10.77%	4.44%	20.94%
Positive predictive value	77.33%	66.21%	86.21%
Negative predictive value	83.72%	69.30%	93.19%
Diagnostic accuracy	79.66%	71.27%	86.51%

The sit to stand test had sensitivity of 89.23% (95% CI 79.06% to 95.56%) in predicting severe COPD spirometry. specificity was 67.92% (95% CI 53.68 to 80.08%), false positive rate was 32.08% (95% CI 19.92% to 46.32%), false negative rate was 10.77% (95% CI 4.44% to 20.94%), positive predictive value was 77.33% (95% CI 66.21% to 86.21%), negative predictive value was 83.72% (95% CI 69.30% to 93.19%), and the total diagnostic accuracy was 79.66% (95% CI 71.27% to 86.51%). (Table 17)

DISCUSSION

DISCUSSION:

COPD has been defined as a preventable and treatable disease with significant extrapulmonary effects that may contribute to its severity in individual patients.[58] Exertional dyspnea is the cardinal symptom of patients with COPD.[59] The daily life of COPD patients is characterized not only by chronic respiratory symptoms but also by exercise intolerance due to their breathlessness. Proper diagnosis and management of this disease consequently include evaluation of exercise tolerance aimed at improved orientation towards pulmonary rehabilitation.[60],[61]Spirometry though is the gold standard test in assessing COPDs; it requires high cost, considerable skill and is not easily available at the peripheral center. Though spirometry is often described as a simple screening test, due consideration is essential on equipment selection, test performance and interpretation of the results.[62] In clinical practice, functional status can be measured by several different methods. Evaluation of exercise tolerance of COPD patients helps to understand the patients' quality of life and predicts the prognosis. 6-minute walking test (6MWT) is a simple tool widely used for assessing functional capacity in COPDs. It is easy to perform, reproducible, and inexpensive. It reproduces the activity of daily living and correlates well with peak oxygen uptake determined by a cardiopulmonary exercise test.[63]The Sit-to-stand (STST) is a simple and practical test, widely adopted to evaluate functionality in community-dwelling elderly. The movement of standing up and sitting down are important functions of daily life, and the inability to perform these basic skills is associated with mortality and with impairment of function and mobility.[16] The present study is conducted to evaluate the functional status by the STST and 6MWT in patients with COPD and to compare results of both tests to parameters of pulmonary function tests so that they can be considered as an alternative to spirometry at places where it is not available.

The mean age of the patients in our study is 64.09 ± 8.31 years which is similar to Vaidya et al[41], and Marius-Gabriel et al[64], which was 64±9.8 years and 63.3 ± 9 years respectively. Meriem et al[50], had a slightly older age group with a mean age of 67.06 ± 8.4 years whereas Rehman et al[53], study had a slightly younger age group with a mean age of 60.50 ± 7.03 years compared with our study.Our study consisted predominantly of the male population, with 94.9% of participants being male with only 5.1% female participants.Vaidya et al[41], had 62.5% males in their study. The anthropometric measurements in our study are the mean height is 172.37 ± 5.03 cm, mean weight is 65.58 ± 5.84 kg, and the mean BMI is 22.12 ± 1.85 (kg/cm2).Major risk factor for COPD is seen to be smoking with 92.4% of the participants being smokers, followed by 21.2% participants having hypertension and 17.8% participants with type 2 diabetic mellitus. Fujimoto et al[49], study also consisted of a predominantly male population with 93.1% males, and all the patients were current or former smokers. Smoking is a major risk factor in Zanini et al[43], study group with all patients had a smoking history of >10 pack-years and received regular treatment with inhaled bronchodilators and inhaled steroids according to current guidelines for their disease stage.

The mean post FEV1 is 47.48 ± 16.14 with a wide range from 10 to 94 in the study population. The mean post-FEV1/FVC is 57.91 ± 12.88 ranging between 0.5 and 86.3. Regarding COPD, 5.08% of the participants had mild COPD, 39.83% participants had moderate COPD, 45.76% of the participants had severe COPD, and 9.32% participants had very severe COPD as per COPD GOLD 2018 Criteria by spirometry. This gave an almost equal proportion with severe/very severe COPD in 55.08% and mild/moderate COPD in 44.91%.

Table 18: COPD severity across studies.

Study	Mild	Moderate	Severe	Very severe
Current study	5.08%	39.83%	45.76%	9.32%
Rehman et al.[53]	7.00%	57.00%	33.00%	3.00%
Fujimoto et al.[49]	33.8%	40.8%	22.3%	3.1%
Meriem et al.[50]	6%	36%	34%	24%
Vaidya et al.[41]	5%	49%	28%	18%

In our study, a positive correlation is observed between the 6MWT and spirometry and the 6MWT showed good predictive validity in predicting COPD as compared with spirometry as indicated by the area under the curve of 0.920 (95% CI 0.874 to 0.966, P value <0.001).The study demonstrated a relationship between the 6MWT and desaturation and heart rate. The heart rate and blood pressure increased, and SpO2 decreased at the end of the 6MWT. In our study, we observed a decrease in SpO2 during the 6MWT, from 93.98 ± 0.82 to 91.75 ± 1.39, similar to that seen in a study by van Gestel et al[54], but they had a decrease of 7.2%. Meena et al[55], reported 6MWT correlated positively to all spirometer parameters post FVC% predicted ($p < 0.0001$). In congruence with our study, Hajare et al[56], reported a significant strong positive correlation between 6 MWD and FEV1, whereas, FVC, FEV1/FVC had a significant moderate positive correlation with 6MWD.

Table 19: Change of cardiorespiratory parameters during the 6MWT.

Study	Parameters	Baseline	End
Current study	Heart Rate (Beats/Min)	72.6 ± 6.36	77.95 ± 7.59
Ozalevli et al.[65]	Heart Rate (Beats/Min)	87±11	110±20
Meriem et al.[50]	Heart Rate (Beats/Min)	84 ± 14	95 ±14
Current study	Blood Pressure(mmhg)	130.73 ± 7.61	136.19 ± 8.27
Ozalevli et al.[65]	Blood Pressure(mmhg)	140±3	148±2
Current study	SpO2(%)	93.98 ± 0.82	91.75 ± 1.39
Meriem et al.[50]	SpO2(%)	95.7 ± 2.7	96.5 ±2.41
Current study	BODE'S INDEX	1.47 ± 0.68	2.47 ± 0.67
Vaidya et al.[51]	BODE'S INDEX	3.1 ± 1.5	not compared in the study
Meriem et al.[50]	BODE'S INDEX	3.62 ± 2.32	not compared in the study

As such, our study demonstrated that the 6MWT has a sensitivity of 81.54% in predicting COPD and the specificity is 79.25%. The positive predictive value is 82.81%, the negative predictive value is 77.78%, and the total diagnostic accuracy was 80.51%. In the literature, the sensitivity, specificity, negative predictive values of 6MWT were not given in any study, and so these values found in the present study cannot be compared. 81.54% of the participants having severe/very severe COPD group, walked <332.49 m and only 18.46% could walk more than 332.50 m. 79.25% of the participants having mild/moderate COPD could walk more than 332.50 m, and only 20.75% could not. Thus, the difference in the proportion of 6-minute walk distance between severity of COPD is found to be statistically significant (p value <0.001) showing its significance in predicting COPD.The mean distance walked on 6MWT is 387.6±111 m in Vaidya et al[41], study. The mean distance covered in Rehman et al[53], study was 399.3 ± 113.0 m. According to a study, it was recognized that

skeletal muscle dysfunction, which is common in COPD patients affects the performance results in such patients. Both 6MWT and 1-min sit to stand tests have the ability to identify such weakness of peripheral muscle in patients of COPD.

Recent data show that the number of repetitions a patient is able to do during the 1-minute STS correlated with the level of physical activity, which makes it a good surrogate of physical activity.[66] This was also reported by van Gestel et al[54], who showed that the number of steps taken per day related to the number of repetitions in the 1-minute STS test among COPD patients. Although the 1-min STS test and 6MWT involve different movements, they both elicited similar physiological responses.During the 1-min STS test, we saw a decrease in SpO2 from 93.98 ± 0.82 to 91.75 ± 1.39 almost similar to that noted in the 6MWT. This corresponds with previous studies that found a decrease in SpO2 of 1–2% in the 1-min STS test.[43],[65]

In our study, a positive correlation is observed between the 1-min sit to stand the test, and it had good predictive validity in predicting COPD as compared with spirometry as indicated by the area under the curve of 0.915. (95% CI 0.866 to 0.963, P value <0.001)

Table 20: Change of cardiorespiratory parameters during the 1-min STS test

Study	Parameter	Baseline	End
Current study	Heart Rate (Beats/Min)	72.6 ± 6.36	77.95 ± 7.59
Vaidya et al.[41]	Heart Rate (Beats/Min)	101.3±15.7	101.9±15.3
Zanini et al.[43]	Heart Rate (Beats/Min)	83±13	99±15
Current study	SpO2(%)	93.98 ± 0.82	91.75 ± 1.39
Vaidya et al.[41]	SpO2(%)	91.6±3.9	91.2±4.4
Zanini et al.[43]	SpO2(%)	94±2	92±3

Our study found that the 1-min sit to stand test had a sensitivity of 89.23% in predicting COPD, specificity was 67.92%, positive predictive value was 77.33%, and the negative predictive value was 83.72%, and the total diagnostic accuracy was 79.66%.Vaidya et al[41], study also demonstrated the utility of the 1-minute STS test in the assessment of COPD patients and reported that its ability to detect a change in exercise tolerance is similar to the 6MWT.

CONCLUSION

CONCLUSION:

- The mean age of the patients in our study is 64.09 ± 8.31 years.
- Our study consisted of predominantly male population with 94.9% participants being male with only 5.1% female participants.
- Major risk factor for COPD is seen to be smoking with 92.4% of the participants being smokers, followed by 21.2% participants having hypertension and 17.8% participants with type 2 diabetic mellitus.
- The mean post FEV1 is 47.48 ± 16.14 with a wide range from 10 to 94 in the study population.
- The mean post FEV1/FVC is 57.91 ± 12.88 ranging between 0.5 and 86.3.
- Regarding COPD, 5.08% of the participants had mild COPD, 39.83% participants had moderate COPD, 45.76% of the participants had severe COPD and 9.32% participants had very severe COPD as per COPD GOLD 2018 Criteria by spirometry. This gave an almost equal proportion with severe/very severe COPD in 55.08% and mild/moderate COPD in 44.91%.
- In our study, a positive correlation is observed between the 6MWT and spirometry and the 6MWT showed a good predictive validity in predicting COPD as compared with Spirometry as indicated by area under the curve of 0.920 (95% CI 0.874 to 0.966, P value <0.001).
- The study demonstrated a relationship between the 6MWT and desaturation and heart rate. The heart rate and blood pressure increased and SpO2 decreased at the end of the 6MWT. In our study, we observed a decrease in SpO2 during the 6MWT, from 93.98 ± 0.82 to 91.75 ± 1.39,

- Our study demonstrated that the 6MWT has a sensitivity of 81.54%in predicting COPD and the specificity is 79.25%.
- Our study found that the 1-min sit to stand test had a sensitivity of 89.23%in predicting COPD, specificity was 67.92%,
- Both 6MWT and 1-min STS test can be used for prediction of COPD severity in low-resource settings.
- 6MWT has less sensitivity and high specificity than 1-min STST.
- Less specificity indicates high negative predictive value for STST.
- 6MWT is more reliable predictor than STST because of high specificity
- It can be concluded that 6MWT and STST both can be used for assessing the severity of COPD in combination with other parameters in places where spirometer is not available.

LIMITATIONS AND RECOMMENDATIONS:

There are few women included in the study. Spirometry parameters, such as DLCO and airway resistance, are not assessed in the present study. Obesity is associated with decreased lung-function measures, and our study population included patients with a mean BMI of 22.12 ± 1.85, which did not include obese patients. It is recommended to include a larger cohort with a significant number of women exclusively designed to evaluate the effect of gender on the clinical manifestations of COPD.

SUMMARY

SUMMARY:

COPD is a leading cause of morbidity and mortality worldwide. In future, the prevalence of COPD is expected to show a rising trend, and by 2030 there may be over 4.5 million deaths annually from COPD and related conditions.[21]The gold standard for the diagnosis of COPD is considered to be the pulmonary function tests. Several tests are now available to measure functional exercise capacity. Most commonly used clinical exercise tests are 6-min walking test (6MWT) and sit to stand test(STST). The aim of this study is to compare the efficacy of 6MWT and 1-min STST in assessing the severity of COPD with spirometry. Our study found that the 1-min sit to stand test had a sensitivity of 89.23% in predicting COPD, specificity was 67.92%, positive predictive value was 77.33%, and the negative predictive value was 83.72%, and the total diagnostic accuracy was 79.66%.Spirometry which is the gold standard for grading severity of COPD, will not be available in remote clinical settings and hence 6MWT and one-minute STST are the best methods for assessing the severity.

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ANNEXURES

PROFORMA FOR DATA COLLECTION

Name: OP/IP no:

Age: Sex: Date of admission:

Address:

Chief complaint:

GENERAL PHYSICAL EXAMINATION:

PR: /min BP: mmhg RR: /min SPO2:

BMI:

SYSTEMIC EXAMINATION:

CARDIOVASCULAR EXAMINATION:

RESPIRATORY EXAMINATION:

PER ABDOMINAL EXAMINATION:

CENTRAL NERVOUS SYSTEM EXAMINATION:

LABORATORY DATA:

Hb gm%	TLC Thousands/mm^3	PLT Thousands/mm^3	B.urea mg/dl	Creatinine mg/dl	Sodium mEq/L	Potassium mEq/L

PULMONARY FUNCTION TEST:

FEV1/FVC		
FEV1%		
COPD GRADING		

SIX MINUTE WALK TEST(m)

DISTANCE COVERED (in mts)	

PARAMETERS	BASELINE	END
DYPNOEA(BORG)		
HEART RATE(BEATS/MIN)		
SYSTOLICBLOOD PRESSURE (mmhg)		
SPO2 (%)		

SIT TO STAND TEST:(n)

PARAMETERS	BASELINE	END
DYPNOEA(BORG)		
HEART RATE(BEATS/MIN)		
SYSTOLICBLOOD PRESSURE (mmhg)		
SPO2 (%)		

PATIENT INFORMATION SHEET

STUDY TITLE: "CORRELATION OF 6 MIN WALKING TESTS , SIT TO STAND TESTS AND PULMONARY FUNCTION TEST IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE"

Study location: R.L.Jalappa Hospital and Research Centre attached to Sri Devaraj Urs Medical College and Research center, Tamaka, Kolar.

Details- Patients diagnosed with fracture distal end of radius admitted in Medicine ward from opd and casualty at R.L.J. HOSPITAL AND RESEARCH CENTRE, attached to SRI DEVARAJ URS MEDICAL COLLEGE,TAMAKA,KOLAR

Patients in this study will have to under go routine blood investigations(CBC, RFT,RBS,Chest-X ray,Urine routine),Pulmonary function test(PFT),6 minute walk test(6MWT) and Sit to Stand test(STST).
Please read the following information and discuss with your family members. You can ask any question regarding the study. If you agree to participate in the study we will collect information (as per proforma) from you or a person responsible for you or both. Relevant history will be taken. This information collected will be used only for dissertation and publication.

All information collected from you will be kept confidential and will not be disclosed to any outsider. Your identity will not be revealed. This study has been reviewed by the Institutional Ethics Committee and you are free to contact the member of the Institutional Ethics Committee. There is no compulsion to agree to this study. The care you will get will not change if you don't wish to participate. You are required to sign/ provide thumb impression only if you voluntarily agree to participate in this study.

CONFIDENTIALITY

Your medical information will be kept confidential by the study doctor and staff and will not be made publicly available. Your original records may be reviewed by your doctor or ethics review board.

For further information/ clarification please contact

Dr.MEGHASHRI.V (Post Graduate),

Department of Medicine,

SDUMC ,Kolar.

CONTACT NO : 9480438683

INFORMED CONSENT FORM

STUDY TITLE: Correlation of 6 min walking, Sit to stand test and pulmonary function test in patients with chronic obstructive pulmonary disease.

STUDY NUMBER:

SUNJECT NAME

AGE:

HOSPITAL NUMBER:

It is hoped that the knowledge of relevant prognostic factors might be useful for early identification of patients at high risk requiring intensive care treatment.If you agree to participate in the study we will collect information (as per proforma) from you or a person responsible for you or both. We will collect the treatment and relevant details from your hospital record. This information collected will be used for only dissertation and publication. The institutional ethical committee has reviewed this study. The care you will get will not change if you don't wish to participate. You are required to sign/ provide thumb impression only if you voluntarily agree to participate in this study.

I understand that I remain free to withdraw from the study at any time and this will not change my future care. I have read or have been read to me and understood the purpose of the study, the procedure that will be used, the risk and benefits associated with my involvement in the study and the nature of information that will be collected and disclosed during the study. I have had the opportunity to ask my questions regarding various aspects of the study and my questions are answered to my satisfaction. I,the undersigned agree to participate in this study and authorize the collection and disclosure of my personal information for dissertation and publication only.

Signature or thumb impression of the subject: Date:

Name and signature of the witness: Date:

Name and signature of person obtaining consent Date:

ರೋಗಿಯ ತಿಳುವಳಿಕೆ ಸಮ್ಮತಿ ನಮೂನೆ

ಸಂಶೋಧಕರ ಹೆಸರು: ಡಾ.ಮೇಘಶ್ರೀ.ವಿ

ಸಂಸ್ಥೆಯ ಹೆಸರು:ಆರ್.ಎಲ್.ಜಾಲಪ್ಪ ಆಸ್ಪತ್ರೆ ಮತ್ತು ಸಂಶೋಧನಾ ಕೇಂದ್ರ -

ಶ್ರೀ ದೇವರಾಜ್ ಅರಸ್ ಮೆಡಿಕಲ್ ಕಾಲೇಜ್ಗೆ ಜೋಡಿಸಲಾಗಿದೆ.

ಪಾಲ್ಗೊಳ್ಳುವವರ ಹೆಸರು:……ಕ್ರಮಸಂಖ್ಯೆ :…….

ನಾನುಶ್ರೀ /ಶ್ರೀಮತಿ..... ನನಗೆ

ಆರ್. ಎಲ್. ಜಾಲಪ್ಪ ಆಸ್ಪತ್ರೆಯಲ್ಲಿ ನಡೆಸಲಾಗುತ್ತಿರುವ ಅಧ್ಯಯನ ''CHRONIC OBSTRUCTIVE PULMONARY DISEASE(COPD)ರೋಗಿಗಳಲ್ಲಿ 6 MIN ವಾಕಿಂಗ್ ಪರೀಕ್ಷೆ (6MWT), SIT TO STAND TEST(STST) ಮತ್ತು PULMONARY FUNCTION TEST ಪರೀಕ್ಷೆಗಳ ಹೋಲಿಕೆ''ದಲ್ಲಿ ನನ್ನನ್ನು ಸೇರಿಸಲ್ಪಡಲಾಗುವುದು ಎಂದು ನನಗೆ ಅರ್ಥವಾಗುವ ಭಾಷೆಯಲ್ಲಿ ವಿವರಿಸಲಾಗಿದೆ.

ಈ ಸಂಶೋಧನಾ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನನ್ನನ್ನು ಆಹ್ವಾನಿಸಲಾಗಿದೆ. ಈ ದಾಖಲೆಯಲ್ಲಿರುವ ಮಾಹಿತಿಯು ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಬೇಕೇ ಅಥವಾ ಬೇಡವೇ ಎಂಬುದನ್ನು ನಿರ್ಧರಿಸಲು ನನಗೆ ನೆರವಾಗುವುದು. ಪ್ರಧಾನ ಸಂಶೋಧಕನೊಂದಿಗೆ ನಾನು ಈ ಅಧ್ಯಯನಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ ನನ್ನ ಅನುಮಾನಗಳನ್ನು ಸ್ಪಷ್ಟ ಪಡಿಸಿಕೂಂಡಿದ್ದೆನೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವಂತೆ ನನಗೆ ಸೂಚಿಸಲಾಗಿದೆ ಏಕೆಂದರೆ ನಾನು ಅರ್ಹತಾ ಮಾನದಂಡಗಳನ್ನು ಪೂರೈಸುತ್ತೇನೆ.ನನ್ನ ರಕ್ತದ ಮಾದರಿಯನ್ನು ಗೊತ್ತು ಪಡಿಸಿದ ಪರೀಕ್ಷೆಗಳಿಗೆ ನಿರ್ವಹಿಸಲು ನಾನು ಡಾ.ಅವರನ್ನು ವಿನಂತಿಸುತ್ತೇನೆ ಮತ್ತು ಅಧಿಕಾರವನ್ನು ನೀಡುತ್ತೇನೆ.

ಕೆಳಗಿನ ನನ್ನ ಸಹಿಯು ಅರ್ಹ ಆರೋಗ್ಯ ವೃತ್ತಿಪರರಿಂದ ಪರೀಕ್ಷೆಯ ಅನುಕೂಲಗಳು, ಅಪಾಯಗಳು ಮತ್ತು ಮಿತಿಗಳನ್ನು ನನ್ನ ತೃಪ್ತಿಗೆ ವಿವರಿಸಲಾಗಿದೆ ಎಂದು ನನ್ನ ಅಂಗೀಕಾರವನ್ನು ರೂಪಿಸುತ್ತದೆ.

ಭಾಗವಹಿಸುವಿಕೆ ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂ ಪ್ರೇರಿತವಾಗಿರುತ್ತದೆ ಮತ್ತು ಮಾದರಿ ಸಂಗ್ರಹಣೆಗೆ ಯಾವುದೇ ಹಣಕಾಸಿನ ಪಾವತಿಯಿಲ್ಲ. ಎಲ್ಲಾ ಪರೀಕ್ಷಾ ಫಲಿತಾಂಶಗಳನ್ನು ವೈದ್ಯಕೀಯ ಗೌಪ್ಯತೆಯೊಂದಿಗೆ ಪರಿಗಣಿಸಲಾಗುತ್ತದೆ ಮತ್ತು ಕಾನೂನಿನ ಅಗತ್ಯವಿದ್ದರೆ ಹೊರತುಪಡಿಸಿ

ಯಾವುದೇ ಹೊರಗಿನವರಿಗೆ ಬಹಿರಂಗ ಪಡಿಸುವುದಿಲ್ಲ. ನನ್ನ ಗೌಪ್ಯತೆ ನಿರ್ವಹಿಸಲ್ಪಡುವವರೆಗೆ ವೈದ್ಯಕೀಯ ಪರೀಕ್ಷೆ, ಪರೀಕ್ಷೆಯ ಮೌಲ್ಯಮಾಪನ ಅಥವಾ ಶಿಕ್ಷಣಕ್ಕಾಗಿ ನನ್ನ ಮಾದರಿಯನ್ನು ಬಳಸಲು ನನ್ನ ಒಪ್ಪಿಗೆಯನ್ನು ನೀಡುತ್ತೇನೆ.

ನಾನು ಈ ಅಧ್ಯಯನದಿಂದ ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಹಿಂತೆಗೆದುಕೊಳ್ಳಲು ಮುಕ್ತ ವಾಗಿರುತ್ತೇನೆ ಮತ್ತು ಇದು ನನ್ನ ಮುಂದಿನ ಕಾಳಜಿಯನ್ನು ಬದಲಿಸುವುದಿಲ್ಲ ಎಂದು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ.

ರೋಗಿಯ ಮಾಹಿತಿ ಪತ್ರವನ್ನು ನಾನು ಓದಿದ್ದೇನೆ ಮತ್ತು ಪ್ರತಿಯನ್ನು ಸ್ವೀಕರಿಸಿದ್ದೇನೆ.ಈ ದಾಖಲೆಯಲ್ಲಿ ಒದಗಿಸಿದ ಮಾಹಿತಿಯನ್ನು ನಾನು ಅರ್ಥಮಾಡಿ ಕೊಂಡಿದ್ದೇನೆ ಮತ್ತು ಪರೀಕ್ಷೆ ಪ್ರಕ್ರಿಯೆ ಸಂಬಂಧಿಸಿದ ಅಪಾಯ ಮತ್ತು ಪರ್ಯಾಯಗಳ ಬಗ್ಗೆ ನಾನು ಹೊಂದಿರುವ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು ನನಗೆ ಅವಕಾಶ ಕಲ್ಪಿಸಲಾಗಿದೆ.

ಹೆಸರು ಮತ್ತು ಸಹಿ / ಹೆಬ್ಬೆರಳುಗುರುತು ದಿನಾಂಕ:

ಪೋಷಕರ / ಪಾಲಕರ ಹೆಸರು /ಹೆಬ್ಬೆರಳು ಗುರುತು ದಿನಾಂಕ:

ಒಪ್ಪಿಗೆ ತೆಗೆದುಕೊಳ್ಳುವ ವ್ಯಕ್ತಿಯ ಸಹಿ ದಿನಾಂಕ:

MASTER SHEET

													6-minute walk distance							
S.no	UHID NUMBER	Age	Gender	Height (in cm)	Weight (in kg)	BMI	HTN	T2DM	Smoker	POST FEV1/FVC	POST FEV1	STAGE	6-minute walk distance	Heart rate (beats/mints) Pre	Heart rate (beats/mints) Post	Blood pressure Pre	Blood pressure Post	SPO2 PRE	SPO2 POST	BODE'S INDEX PRE	BODE'S INDEX POST
1	639336	60	Male	181	77	23.5	No	No	Yes	53.7	56	Moderate	340	78	90	130	140	96	94	1	2
2	637625	65	Male	176	70	22.6	Yes	No	Yes	70.4	59	Moderate	355	70	80	126	140	94	92	1	2
3	641923	70	Male	170	60	20.8	No	Yes	Yes	52.7	10	Very severe	170	72	82	140	150	94	91	3	4
4	644685	65	Male	178	70	22.1	No	No	Yes	64.0	39	Severe	320	80	82	136	138	95	93	2	3
5	652889	50	Male	168	74	26.2	No	No	Yes	69.7	50	Moderate	330	82	86	130	134	94	92	1	2
6	670757	71	Male	174	69	22.8	No	No	Yes	49.6	37	Severe	285	80	88	130	138	94	90	2	3
7	671039	68	Male	165	66	24.2	No	No	Yes	48.8	38	Severe	300	74	80	126	130	93	91	2	3
8	671068	68	Male	169	72	25.2	No	No	Yes	43.1	35	Severe	290	74	86	130	144	93	90	2	3
9	704412	60	Male	165	60	22.0	No	No	Yes	56.7	56	Moderate	340	78	84	120	126	95	92	1	2
10	673033	46	Male	170	70	24.2	No	No	Yes	63.3	76	Moderate	430	76	78	130	136	94	93	1	2
11	673127	55	Male	179	70	21.8	No	No	Yes	59.2	84	Mild	450	68	70	128	130	95	94	0	1
12	676333	70	Male	178	68	23.0	Yes	Yes	Yes	35.6	19	Very severe	250	70	76	136	140	94	92	2	3
13	678792	60	Male	173	73	24.4	No	No	Yes	63.6	31	Severe	240	72	76	130	130	95	93	2	3
14	679496	70	Male	176	68	22.0	Yes	No	Yes	67.8	41	Severe	310	78	82	126	128	93	91	2	3
15	683826	72	Male	174	64	21.1	Yes	No	Yes	69.4	48	Severe	360	68	72	110	116	93	91	2	3
16	686875	56	Male	173	74	24.7	No	Yes	Yes	55.0	51	Moderate	340	82	84	130	136	95	93	1	2
17	689904	70	Male	168	60	21.3	No	No	Yes	68.1	45	Severe	320	70	74	146	150	93	91	2	3

18	716279	42	Male	160	60	23.4	No	No	Yes	64.6	81	Mild	440	64	68	120	126	95	94	0	1
19	692530	70	Male	170	64	22.1	No	No	Yes	35.6	53	Moderate	390	70	72	130	136	93	91	1	2
20	699608	45	Male	172	70	23.7	No	No	Yes	66.8	94	Mild	450	64	66	126	130	94	94	0	1
21	673506	70	Male	169	58	20.3	Yes	Yes	Yes	40.0	37	Severe	320	66	70	126	130	94	92	2	3
22	700309	50	Male	168	72	25.5	No	No	Yes	67.4	59	Moderate	430	70	75	130	134	94	92	1	2
23	673506	72	Male	172	58	19.6	Yes	Yes	Yes	60.7	45	Severe	360	66	76	130	140	93	90	2	3
24	665550	70	Female	174	63	20.8	No	Yes	No	65.5	71	Moderate	440	70	72	126	130	94	92	0	1
25	702962	65	Male	174	68	22.5	No	No	Yes	60.7	45	Severe	360	76	84	130	136	93	91	2	3
26	705307	40	Male	175	70	22.9	No	No	Yes	62.1	82	Mild	450	60	64	120	126	94	92	0	1
27	705686	71	Male	180	60	18.5	Yes	Yes	Yes	48.6	37	Severe	280	70	72	130	132	94	93	2	3
28	705711	60	Male	178	70	22.1	No	No	Yes	61.7	49	Severe	390	72	76	130	134	94	92	2	3
29	708202	58	Male	172	69	23.3	No	No	Yes	65.5	71	Moderate	410	74	78	130	136	94	93	0	1
30	797384	65	Female	160	60	23.4	No	No	No	68.9	53	Moderate	390	68	70	120	126	96	94	1	2
31	196581	49	Male	165	60	22.0	No	No	Yes	55.7	53	Moderate	380	67	70	126	130	94	91	1	2
32	705246	67	Male	168	61	21.6	No	No	Yes	48.6	31	Severe	245	80	86	136	140	94	91	2	3
33	710279	69	Male	161	55	21.2	No	No	Yes	61.7	49	Severe	380	80	84	126	128	93	90	2	3
34	709210	72	Male	167	57	20.4	Yes	Yes	Yes	30.5	26	Very severe	290	67	76	140	146	93	90	2	3
35	709518	65	Male	172	57	19.3	No	No	Yes	58.7	45	Severe	370	70	76	132	136	93	90	2	3
36	702626	75	Male	174	56	18.5	No	No	Yes	55.7	55	Moderate	380	70	80	130	140	94	90	1	2
37	560733	60	Male	179	68	21.2	No	No	Yes	61.8	66	Moderate	420	70	76	140	146	94	92	1	2
38	710589	75	Male	174	64	21.1	Yes	No	Yes	52.8	39	Severe	290	80	84	140	144	94	92	2	3
39	710708	56	Male	179	70	22.1	No	No	Yes	65.0	64	Moderate	390	80	82	130	136	94	92	1	2
40	654765	62	Female	165	56	20.6	No	No	Yes	56.0	30	Severe	230	70	78	130	134	94	92	2	3
41	504610	72	Male	176	70	22.6	No	Yes	Yes	66.8	39	Severe	295	70	76	134	140	93	90	2	3

42	806631	70	Female	160	60	23.4	No	No	No	59.5	58	Moderate	365	78	84	140	146	94	90	1	2
43	712519	60	Male	178	70	22.6	No	No	Yes	86.3	41	Severe	310	67	74	130	136	94	92	2	3
44	713563	74	Male	170	70	24.2	Yes	Yes	Yes	56.2	29	Very severe	300	68	76	120	130	94	91	2	3
45	715634	70	Male	179	70	21.8	No	No	Yes	44.6	39	Severe	290	78	86	130	140	95	91	2	3
46	678792	60	Male	169	58	20.6	No	No	Yes	67.4	58	Moderate	360	70	75	150	160	94	91	1	2
47	669756	70	Male	174	68	22.5	No	Yes	Yes	44.1	19	Very severe	240	72	76	134	140	95	92	2	3
48	678792	60	Male	170	73	25.3	No	No	Yes	69.6	50	Moderate	320	68	74	130	138	95	92	1	2
49	718327	60	Male	178	70	22.1	No	No	Yes	68.6	71	Moderate	440	67	70	126	136	94	91	0	1
50	717192	67	Male	181	70	21.4	No	No	Yes	62.6	39	Severe	300	63	70	136	146	95	92	2	3
51	639081	75	Male	174	68	22.5	Yes	Yes	Yes	33.0	21	Very severe	210	80	88	130	138	94	90	2	3
52	723618	51	Male	175	70	22.9	No	No	No	62.1	81	Mild	440	64	66	126	130	94	94	0	1
53	759031	58	Male	180	60	18.5	No	No	Yes	71.6	71	Moderate	410	66	70	120	130	94	94	1	2
54	759851	69	Male	178	70	22.1	No	No	Yes	66.2	39	Severe	310	76	84	130	136	93	91	2	3
55	760035	70	Male	172	57	19.3	Yes	No	Yes	66.0	38	Severe	290	80	88	130	138	94	90	2	3
56	760905	70	Male	170	60	20.8	Yes	Yes	Yes	43.0	34	Severe	270	76	82	140	146	94	90	2	3
57	761014	75	Male	173	73	24.4	No	No	Yes	66.0	38	Severe	290	76	84	130	136	93	91	2	3
58	761011	65	Male	176	68	22.0	No	No	Yes	59.0	32	Severe	240	64	66	126	130	94	94	2	3
59	752682	51	Male	174	64	21.1	No	No	Yes	66.8	94	Mild	445	76	84	130	136	93	91	0	1
60	760038	68	Male	165	60	22.0	No	Yes	Yes	69.1	41	Severe	310	76	84	130	136	93	91	2	3
61	762615	53	Male	168	61	21.6	No	No	Yes	57.0	59	Moderate	390	70	76	120	130	94	94	0	1
62	763136	72	Male	180	60	18.5	Yes	Yes	Yes	35.6	28	Very severe	300	80	88	130	138	94	90	2	3
63	763626	55	Male	167	57	20.4	No	No	Yes	64.0	50	Moderate	330	64	66	126	130	95	94	0	1
64	763635	53	Male	172	57	19.3	No	No	Yes	53.6	60	Moderate	405	60	66	128	130	94	93	1	2
65	764124	45	Male	170	64	22.1	No	No	Yes	52.8	59	Moderate	410	70	76	124	130	95	94	1	2

66	764699	57	Male	172	70	23.7	No	No	Yes	53.6	55	Moderate	340	64	68	126	130	95	94	1	2
67	764279	75	Male	169	58	20.3	Yes	Yes	Yes	68.9	63	Moderate	420	76	84	130	136	93	91	2	3
68	720675	75	Male	170	60	20.8	No	No	Yes	36.5	26	Very severe	250	72	76	134	140	95	92	2	3
69	766534	73	Male	172	58	19.6	No	Yes	Yes	29.7	32	Severe	240	70	74	146	150	93	91	2	3
70	766753	63	Male	173	74	24.7	No	No	Yes	59.6	36	Severe	280	76	84	140	146	93	90	2	3
71	767919	44	Male	168	60	21.3	No	No	No	52.8	59	Moderate	370	70	76	110	110	95	93	1	2
72	767615	60	Male	160	60	23.4	No	No	Yes	61.2	33	Severe	250	64	66	126	130	94	94	2	3
73	762023	56	Male	170	64	22.1	Yes	No	Yes	68.9	63	Moderate	400	76	84	130	136	93	91	1	2
74	769785	74	Male	180	60	18.5	No	No	Yes	66.2	39	Severe	320	80	88	130	138	94	90	2	3
75	768805	58	Male	181	77	23.5	No	No	No	69.0	54	Moderate	340	70	74	146	150	93	91	1	2
76	820978	70	Female	168	60	21.3	No	No	No	69.0	65	Moderate	425	76	84	134	136	93	90	1	2
77	769122	75	Male	170	60	20.8	No	Yes	Yes	43.0	29	Very severe	310	70	74	146	150	93	91	2	3
78	770200	60	Male	178	70	22.1	No	No	Yes	68.8	65	Moderate	430	72	76	134	140	95	92	1	2
79	723606	71	Male	168	74	26.2	No	No	Yes	48.3	30	Severe	230	90	96	140	146	95	90	2	3
80	681734	66	Male	175	70	22.9	No	No	Yes	57.6	47	Severe	330	76	84	140	144	93	91	2	3
81	773045	61	Male	173	73	24.4	No	No	Yes	63.9	70	Moderate	440	62	66	128	130	96	94	1	2
82	773689	70	Male	178	70	22.1	Yes	No	Yes	68.5	38	Severe	315	72	76	134	140	95	92	2	3
83	774183	70	Male	172	69	23.3	No	No	Yes	45.6	34	Severe	310	80	88	130	138	94	90	2	3
84	774101	60	Male	170	73	25.3	No	No	Yes	61.9	64	Moderate	410	62	66	126	130	94	93	1	2
85	774569	71	Male	176	70	22.6	No	No	Yes	69.8	37	Severe	320	78	84	130	136	93	91	2	3
86	769122	75	Male	173	73	24.4	No	No	Yes	59.2	45	Severe	370	70	74	146	150	93	91	2	3
87	774899	70	Male	172	58	19.6	No	No	Yes	65.5	47	Severe	380	80	88	130	138	94	90	2	3
88	774841	70	Male	170	70	24.2	No	No	Yes	68.8	45	Severe	360	90	94	144	148	94	92	2	3
89	691372	75	Male	180	60	18.5	Yes	No	Yes	67.4	34	Severe	245	70	74	146	150	93	91	2	3

90	775948	65	Male	169	58	20.3	No	No	Yes	61.2	50	Moderate	325	72	76	134	140	95	92	1	2
91	776088	61	Male	168	72	25.5	No	No	Yes	62.2	52	Moderate	330	68	70	128	130	95	94	1	2
92	776475	70	Male	172	58	19.6	Yes	No	Yes	42.8	30	Severe	240	80	88	130	138	94	90	2	3
93	776911	52	Male	174	63	20.8	No	No	Yes	63.6	64	Moderate	410	76	84	130	136	93	91	1	2
94	777271	72	Male	174	68	22.5	No	Yes	Yes	51.1	45	Severe	350	70	74	130	138	93	90	2	3
95	777351	75	Male	169	58	20.6	Yes	No	Yes	40.7	25	Very severe	240	90	100	140	146	95	90	2	3
96	776422	65	Male	174	68	22.5	No	No	Yes	67.4	34	Severe	260	80	84	136	136	93	91	2	3
97	778172	50	Male	170	73	25.3	No	No	No	67.5	52	Moderate	330	64	66	126	130	94	94	1	2
98	670978	60	Male	178	70	22.1	No	No	Yes	68.4	50	Moderate	320	70	74	120	120	94	93	1	2
99	778533	59	Male	181	70	21.4	No	No	Yes	67.2	54	Moderate	335	68	70	110	110	95	94	1	2
100	778639	65	Male	174	69	22.8	No	No	Yes	65.4	36	Severe	290	72	76	134	140	95	92	2	3
101	778731	64	Male	165	66	24.2	No	No	Yes	68.0	32	Severe	240	76	84	130	136	93	91	2	3
102	778017	55	Male	169	72	25.2	No	No	Yes	63.9	70	Moderate	440	64	66	126	130	94	94	1	2
103	339117	58	Male	165	60	22.0	No	No	Yes	61.9	64	Moderate	400	60	66	120	120	96	94	1	2
104	779371	65	Male	170	70	24.2	Yes	No	Yes	59.3	28	Very severe	210	80	84	140	146	93	91	2	3
105	812974	66	Female	169	58	20.3	No	No	No	61.2	50	Moderate	320	70	74	130	130	94	94	1	2
106	780337	65	Male	179	68	21.2	No	No	Yes	62.2	52	Moderate	330	72	76	134	140	95	92	1	2
107	780783	67	Male	174	64	21.1	No	No	Yes	62.4	39	Severe	200	76	84	130	136	93	91	2	3
108	657355	60	Male	179	70	22.1	Yes	No	Yes	63.6	64	Moderate	390	68	70	128	130	95	94	1	2
109	781280	70	Male	165	56	20.6	No	No	Yes	66.3	35	Severe	350	80	84	142	146	94	91	2	3
110	781810	65	Male	178	68	23.0	No	No	Yes	67.5	52	Moderate	330	72	76	134	140	95	92	1	2
111	782321	70	Male	173	73	24.4	Yes	Yes	Yes	0.5	37	Severe	370	80	88	130	138	94	90	2	3
112	783209	65	Male	176	68	22.0	No	No	Yes	0.5	33	Severe	240	76	84	130	136	93	91	2	3
113	785030	60	Male	174	64	21.1	No	No	Yes	68.4	50	Moderate	320	64	66	126	130	94	94	1	2

114	785079	62	Male	173	74	24.7	No	No	Yes	60.3	56	Moderate	345	68	70	110	114	94	93	1	2
115	785853	70	Male	180	60	18.5	Yes	Yes	Yes	40.3	30	Severe	240	80	86	134	140	93	90	2	3
116	786083	74	Male	172	57	19.3	Yes	No	Yes	47.5	36	Severe	260	84	88	130	138	94	90	2	3
117	790377	70	Male	170	64	22.1	No	No	Yes	53.3	33	Severe	225	76	84	130	136	94	91	2	3
118	791788	67	Male	174	69	22.8	No	No	Yes	48.0	42	Severe	330	70	74	146	150	93	91	2	3

S.no	UHID NUMBER	Sit to stand test	Sit to stand test								CHEST X RAY
			Heart rate (beats/mints) Pre	Heart rate (beats/mints) Post	Blood pressure Pre	Blood pressure Post	SPO2 PRE	SPO2 POST	BODE'S INDEX PRE	BODE'S INDEX POST	
1	639336	16	78	90	130	140	96	94	1	2	NORMAL
2	637625	17	70	80	126	140	94	92	1	2	NORMAL
3	641923	10	72	82	140	150	94	91	3	4	EMPHYSEMA
4	644685	14	80	82	136	138	95	93	2	3	NORMAL
5	652889	15	82	86	130	134	94	92	1	2	NORMAL
6	670757	14	80	88	130	138	94	90	2	3	EMPHYSEMA
7	671039	14	74	80	126	130	93	91	2	3	EMPHYSEMA
8	671068	13	74	86	130	144	93	90	2	3	EMPHYSEMA
9	704412	17	78	84	120	126	95	92	1	2	NORMAL
10	673033	20	76	78	130	136	94	93	1	2	NORMAL
11	673127	22	68	70	128	130	95	94	0	1	NORMAL
12	676333	12	70	76	136	140	94	92	2	3	EMPHYSEMA
13	678792	13	72	76	130	130	95	93	2	3	EMPHYSEMA
14	679496	15	78	82	126	128	93	91	2	3	NORMAL
15	683826	16	68	72	110	116	93	91	2	3	EMPHYSEMA
16	686875	15	82	84	130	136	95	93	1	2	NORMAL
17	689904	15	70	74	146	150	93	91	2	3	EMPHYSEMA
18	716279	21	64	68	120	126	95	94	0	1	NORMAL
19	692530	13	70	72	130	136	93	91	1	2	NORMAL
20	699608	21	64	66	126	130	94	94	0	1	NORMAL
21	673506	14	66	70	126	130	94	92	2	3	EMPHYSEMA
22	700309	17	70	75	130	134	94	92	1	2	NORMAL
23	673506	15	66	76	130	140	93	90	2	3	EMPHYSEMA
24	665550	19	70	72	126	130	94	92	0	1	NORMAL
25	702962	15	76	84	130	136	93	91	2	3	EMPHYSEMA
26	705307	20	60	64	120	126	94	92	0	1	NORMAL
27	705686	14	70	72	130	132	94	93	2	3	EMPHYSEMA

28	705711	16	72	76	130	134	94	92	2	3	EMPHYSEMA
29	708202	19	74	78	130	136	94	93	0	1	NORMAL
30	797384	15	68	70	120	126	96	94	1	2	NORMAL
31	196581	15	67	70	126	130	94	91	1	2	NORMAL
32	705246	13	80	86	136	140	94	91	2	3	EMPHYSEMA
33	710279	16	80	84	126	128	93	90	2	3	EMPHYSEMA
34	709210	13	67	76	140	146	93	90	2	3	NORMAL
35	709518	15	70	76	132	136	93	90	2	3	EMPHYSEMA
36	702626	16	70	80	130	140	94	90	1	2	NORMAL
37	560733	18	70	76	140	146	94	92	1	2	NORMAL
38	710589	14	80	84	140	144	94	92	2	3	EMPHYSEMA
39	710708	17	80	82	130	136	94	92	1	2	NORMAL
40	654765	13	70	78	130	134	94	92	2	3	EMPHYSEMA
41	504610	14	70	76	134	140	93	90	2	3	EMPHYSEMA
42	806631	16	78	84	140	146	94	90	1	2	NORMAL
43	712519	15	67	74	130	136	94	92	2	3	EMPHYSEMA
44	713563	13	68	76	120	130	94	91	2	3	EMPHYSEMA
45	715634	14	78	86	130	140	95	91	2	3	EMPHYSEMA
46	678792	16	70	75	150	160	94	91	1	2	NORMAL
47	669756	10	72	76	134	140	95	92	2	3	EMPHYSEMA
48	678792	15	68	74	130	138	95	92	1	2	NORMAL
49	718327	19	67	70	126	136	94	91	0	1	NORMAL
50	717192	14	63	70	136	146	95	92	2	3	EMPHYSEMA
51	639081	10	80	88	130	138	94	90	2	3	EMPHYSEMA
52	723618	19	64	66	126	130	94	94	0	1	NORMAL
53	759031	19	66	70	120	130	94	94	1	2	NORMAL
54	759851	14	76	84	130	136	93	91	2	3	EMPHYSEMA
55	760035	14	80	88	130	138	94	90	2	3	EMPHYSEMA
56	760905	13	76	82	140	146	94	90	2	3	EMPHYSEMA
57	761014	15	76	84	130	136	93	91	2	3	NORMAL
58	761011	12	64	66	126	130	94	94	2	3	EMPHYSEMA
59	752682	20	76	84	130	136	93	91	0	1	NORMAL

60	760038	15	76	84	130	136	93	91	2	3	EMPHYSEMA
61	762615	16	70	76	120	130	94	94	0	1	NORMAL
62	763136	10	80	88	130	138	94	90	2	3	EMPHYSEMA
63	763626	15	64	66	126	130	95	94	0	1	NORMAL
64	763635	17	60	66	128	130	94	93	1	2	NORMAL
65	764124	16	70	76	124	130	95	94	1	2	NORMAL
66	764699	16	64	68	126	130	95	94	1	2	NORMAL
67	764279	17	76	84	130	136	93	91	2	3	NORMAL
68	720675	11	72	76	134	140	95	92	2	3	EMPHYSEMA
69	766534	12	70	74	146	150	93	91	2	3	EMPHYSEMA
70	766753	14	76	84	140	146	93	90	2	3	EMPHYSEMA
71	767919	16	70	76	110	110	95	93	1	2	NORMAL
72	767615	13	64	66	126	130	94	94	2	3	EMPHYSEMA
73	762023	17	76	84	130	136	93	91	1	2	NORMAL
74	769785	15	80	88	130	138	94	90	2	3	EMPHYSEMA
75	768805	15	70	74	146	150	93	91	1	2	NORMAL
76	820978	17	76	84	134	136	93	90	1	2	NORMAL
77	769122	12	70	74	146	150	93	91	2	3	EMPHYSEMA
78	770200	17	72	76	134	140	95	92	1	2	NORMAL
79	723606	12	90	96	140	146	95	90	2	3	EMPHYSEMA
80	681734	17	76	84	140	144	93	91	2	3	NORMAL
81	773045	18	62	66	128	130	96	94	1	2	NORMAL
82	773689	14	72	76	134	140	95	92	2	3	NORMAL
83	774183	14	80	88	130	138	94	90	2	3	NORMAL
84	774101	17	62	66	126	130	94	93	1	2	EMPHYSEMA
85	774569	14	78	84	130	136	93	91	2	3	NORMAL
86	769122	16	70	74	146	150	93	91	2	3	EMPHYSEMA
87	774899	16	80	88	130	138	94	90	2	3	EMPHYSEMA
88	774841	15	90	94	144	148	94	92	2	3	NORMAL
89	691372	13	70	74	146	150	93	91	2	3	NORMAL
90	775948	15	72	76	134	140	95	92	1	2	EMPHYSEMA
91	776088	15	68	70	128	130	95	94	1	2	NORMAL

92	776475	12	80	88	130	138	94	90	2	3	EMPHYSEMA
93	776911	17	76	84	130	136	93	91	1	2	NORMAL
94	777271	16	70	74	130	138	93	90	2	3	NORMAL
95	777351	11	90	100	140	146	95	90	2	3	EMPHYSEMA
96	776422	13	80	84	136	136	93	91	2	3	NORMAL
97	778172	15	64	66	126	130	94	94	1	2	NORMAL
98	670978	15	70	74	120	120	94	93	1	2	EMPHYSEMA
99	778533	15	68	70	110	110	95	94	1	2	NORMAL
100	778639	14	72	76	134	140	95	92	2	3	NORMAL
101	778731	12	76	84	130	136	93	91	2	3	EMPHYSEMA
102	778017	18	64	66	126	130	94	94	1	2	NORMAL
103	339117	17	60	66	120	120	96	94	1	2	NORMAL
104	779371	10	80	84	140	146	93	91	2	3	EMPHYSEMA
105	812974	15	70	74	130	130	94	94	1	2	NORMAL
106	780337	15	72	76	134	140	95	92	1	2	NORMAL
107	780783	15	76	84	130	136	93	91	2	3	EMPHYSEMA
108	657355	17	68	70	128	130	95	94	1	2	NORMAL
109	781280	14	80	84	142	146	94	91	2	3	EMPHYSEMA
110	781810	15	72	76	134	140	95	92	1	2	NORMAL
111	782321	14	80	88	130	138	94	90	2	3	NORMAL
112	783209	12	76	84	130	136	93	91	2	3	EMPHYSEMA
113	785030	15	64	66	126	130	94	94	1	2	NORMAL
114	785079	16	68	70	110	114	94	93	1	2	NORMAL
115	785853	12	80	86	134	140	93	90	2	3	EMPHYSEMA
116	786083	14	84	88	130	138	94	90	2	3	NORMAL
117	790377	13	76	84	130	136	94	91	2	3	EMPHYSEMA
118	791788	15	70	74	146	150	93	91	2	3	EMPHYSEMA