



6 MINUTE WALK TEST FOR ASSESSMENT OF SEVERITY OF COPD PATIENTS

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ABSTRACT

Introduction: Six minute walk test is a common test that is used by many physicians in India for cardiopulmonary assessment. It is a simple bedside test. It is sub-maximal test which can be used as a clinical indicator for the severity of disease. In this study, we tried to find a co-relation between 6 minute walk test and spirometry for COPD patients. **Methods:** This was a cross-sectional study with 128 patients who were diagnosed with COPD (Gold criteria). The patients with cardiac conditions, TB, other pulmonary infections, interstitial lung diseases, chronic kidney disease etc were excluded from the study. Spirometry with FEV1, FVC, FEV1/FVC were tested in all patients. 6 minute walk test was then performed in all patients. Whole data was analysed statically. **Results:** there is a positive co-relation between 6 minute walk test distance and FEV1 and 6 min walk test distance ($r=0.890$) and FEV1/FVC ($r=0.870$). (p value <0.001) With a reduction in FEV1 and FEV1/FVC, there is a reduction in the distance travelled by the patient showing that there is a positive correlation between. **Conclusion:** In chronic pulmonary obstructive disease, there is a statistical significance between 6 minute walk test and spirometry parameters. With decline in pulmonary function, there is a decrease in 6 minute walk test and hence spirometry can be 6 minute walk test for assessment of severity of COPD.

KEYWORDS: FEV1, FVC, FEV1/FVC.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a global public health problem. Incidence of COPD is increasing and is a considerable cause of morbidity. Among all the risk factors, smoking is significantly associated with COPD.^[1]

Number of procedures are available to assess the cardio-pulmonary function and capacity. Among them, spirometry is the gold standard for its accuracy.^[2,3] But due to finite available personnel and resources, simple procedures for the assessment of the pulmonary function are to be used such as 6-Minute walk test (6-MWT).

6-MWT is a feasible, easy to perform procedure, better tolerated by the subjects, generating similar results as other complex procedures.^[4,5] Objective of this procedure is to measure the ability of a patient to perform the regular activities and to assess the severity and the prognosis of the disease. The aim of this study is to analyse the correlation between 6-MWT and the severity of the COPD.

METHODS

This is a cross-sectional study. In this study, 128 patients were included. All were diagnosed with COPD as per the Gold Criteria. Thorough physical examination was done in all the patients. Patients with ischemic heart diseases, ventricular dysfunction, active pulmonary infections, liver diseases, kidney diseases etc were excluded from the study. CBC was done in all patients to rule out anaemia in patients as it can also add to breathlessness and can alter the test results of spirometry. Liver function tests and renal function tests were done to rule out liver parenchymal diseases and chronic kidney/ acute kidney injury which might potentially cause breathlessness. 2D-echo was done to rule out ischemic conditions or ventricular dysfunctions. Spirometry with FEV1, FVC, FEV1/FVC were tested in all patients. 6 minute walk test was then performed in all patients. Whole data was analysed statically.

RESULTS

The baseline characteristics of the study population are shown in the table 1. The average age of the population was 56 ± 7.65 years. There were 24 females and 104 males in the study. The average height of the study

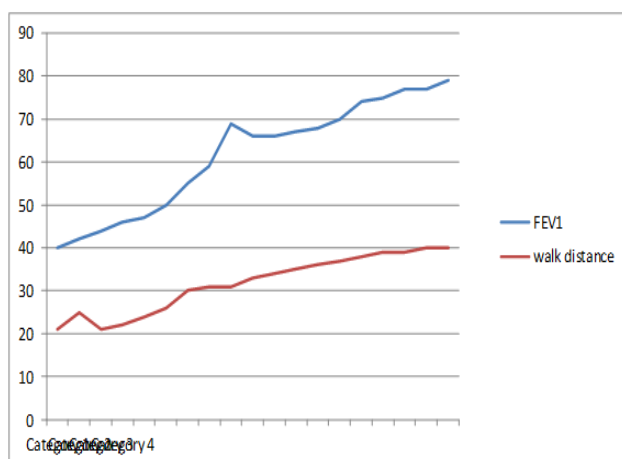
population was 170 ± 8.64 cms. 88(68.75%) patients were smokers and the rest were non-smokers. 2 (1.56%) populations had a family history of copd. The average BMI of the study participants was 28 ± 4.89 .

Table 1: Baseline characteristics of the study population.

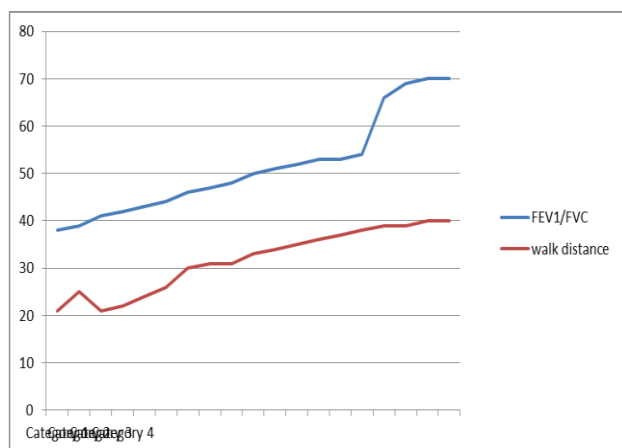
Age	56 $\pm$ 7.65
Sex	24 females
Height	170 $\pm$ 8.64
Smoking	88(68.75%)
Family history	2(1.56%)
BMI	28 $\pm$ 4.89

Association of 6 minute walk distance and spirometry functions is shown in the charts before.

The findings between FEV1 and walk distance of 6 minutes is shown in the graph below. As FEV1 decreases, there is a direct reduction in the 6 minute walk distance. The p value was calculated to be 0.01.



The findings between FEV1/FVC and 6 minute walk are shown in the graph below. As FEV1/FVC decreases, there is a direct reduction in the 6 minute walk distance. The p value was calculated to be 0.02.



DISCUSSION

The study was done to correlate the 6MWD and spirometry para metres in patients with COPD(gold criteria). 128 patients were selected on the basis of inclusion and exclusion criteria. The patients were all in the age group of 50 to 80 years. Pearson's correlation coefficient was used to correlate the six minutes walking distance with the spirometry para metres. Statistical analysis by SPSS showed that there is a significant positive correlation (Pearson's correlation coefficient $r=0.890$) between FEV1 and six minute walking distance.

FEV1/FVC was ($r=0.870$)($p<0.001$). This shows that decrease in spirometry para metres was associated with decrease in six minutes walking distance. Limitation in the chronic airflow is the characteristic of COPD which is caused by decrease in the surface area and the small airway disease. Along with Changes in the lungs COPD also causes multiple extra pulmonary changes which results in reduced physical activity. In this study we found that there is significant correlation between the person predicted six small minute walking distance and spirometry para metres there is decrease in percent predicted six minutes walking distance with decrease in pulmonary function test because of peripheral muscle weakness leading to impaired exercise tolerance in COPD patient. As the disease advances there is loss of fat associated with muscle atrophy and conditioning of the muscle mass which leads to exercise intolerance in patients with COPD. Also associated with the weight loss anaemia in the depression that a significant effect on the mortality of COPD. Multiple factor plays an important role in the dysfunction of the skeletal muscles in the COPD. The most important among them is hypoxia, that is significantly contributing this is process. hypoxia leads to muscle cell apoptosis and the protein degradation by proteas am pathway with increase in inflammatory cytokines such as interleukin -8. Another mechanism by which skeletal muscle dysfunction occurs is due to reactive oxygen specieS. reactive oxygen species can cause damage to the membrane phospholipids DNA and proteins that can lead to inflammation which impairs skeletal muscle contractility. Chronic hypoxaemia can lead to polycythaemia pulmonary hypertension stomach and Flemish and and muscle dysfunction which will lead to decrease in quality of life reduced exercise tolerance increase in the risk of cardiovascular morbidity.

Pulmonary function test has been proven the gold standard in diagnosis of the COPD at present. However pulmonary function test is difficult to perform for some patient especially for the patients that has a severe muscular dysfunction and extreme Disney and it cannot provide the sufficient result in these patients. In this Circumstances six minute walk in test has been proven the the best test in the measuring the functional status of these patients. Therefore the correlation of the six minute walk in test and the pulmonary function test in the

patients with COPD makes this test easy and simple for assessing the disease severity and can be easily performed in the advance COPD. There for six minute walk test can be used as an appropriate tool in combination with other parameters in the lung function in the COPD patient

CONCLUSION

In chronic pulmonary obstructive disease, there is a statistical significance between 6 minute walk test and spirometry parameters. With decline in pulmonary function, there is a decrease in 6 minute walk test and hence spirometry can be 6 minute walk test for assessment of severity of COPD.

REFERENCES

1. Barnes PJ. Chronic obstructive pulmonary disease: A growing But Neglected Global epidemic. *Plos Med*, 2007; 4(5): 112.
2. Watz H, Magnussen H. Comorbidities of COPD. *Internist (Berl)*, 2006; 47(9): 895-6.
3. The Official statement of the American thoracic society, approved by the American thoracic society board of directors 2002. *Am J Respir Crit Care Med*, 2002; 166: 111-7.
4. Miyamoto S, Nagaya N, Satoh T, Kyotani S, Sakamaki F, Fujita M, et al. Clinical correlates and prognostic significance of six-minute walk test in patients with primary pulmonary hypertension: comparison with cardiopulmonary exercise testing. *Am J Res Crit Care Med*, 2000; 161(2): 487-92.
5. Chetta A, Aiello M, Foresi A, Marangio E, D'Ippolito R, Castagnaro A, et al. Relationship between outcome measures of six-minute walk test and baseline lung function in patients with interstitial lung disease. Sarcoidosis, vasculitis, and diffuse lung diseases: *J WASOG*, 2001; 18(2): 170-5.