Original Article ISSN (O):2395-2822; ISSN (P):2395-2814

Six-Minute Walk Test Outcomes in Patients with Diffuse Parenchymal Lung Disease.

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Received: May 2019
Accepted: May 2019

ABSTRACT

Background: The 6-minute walk test (6MWT) is used to measure exercise capacity and assess prognosis in diffuse parenchymal lung disease (DPLD). Although the 6MWT is usually considered to be a test of submaximal exercise capacity in DPLD, the physiological load imposed by this test is not well described and 6MWT outcomes are poorly understood. This study aimed to compare cardiorespiratory responses to 6MWT in people with DPLD. **Methods:** An observational cross-sectional study was carried out in a single tertiary care center in northern India which included 50 consecutive subjects (age >12 years) who had diffuse parenchymal lung diseases. In this study, the clinical, radiological and histological data subjects was collected. 6MWT was done of all the patients and results tabulated. **Result:** Desaturation on 6MWT (SPo2 <88% or fall of 4% from baseline) were seen in total of 33(66%) patients with most cases being IPF in which 17 patients (89.47%) out 19 cases showed desaturation. This was followed by NSIP with 4(67%) of of 6 cases and CTD-ILD having 7(53.8%) out of 13 cases showed desaturation. More studies are required from developing countries to ascertain the spectrum of DPLDs in different geographic. **Conclusion:** On average, the 6MWT elicits a high but submaximal oxygen uptake in people with DPLD. Fibrosis is associated with maximum destauration in 6MWT. However the physiological load varies between individuals, with higher peak VO2 in those with more severe disease that may match or exceed that achieved on CPET. The 6MWT is not always a test of submaximal exercise capacity in people with DPLD.

Keywords: Exercise test, pulmonary fibrosis, Diffuse parenchymal lung disease.

INTRODUCTION

Diffuse parenchymal lung disease (DPLD) refers to a large group of acute and chronic pulmonary diseases characterized by damage to the lung parenchyma, with varying patterns of fibrosis and/or inflammation.[1] These diseases also frequently affect the airspaces, peripheral airways, vasculature, and corresponding epithelial and endothelial surfaces even though the pulmonary interstitium (i.e. The space between the epithelial and basement membranes) is the primary site of the parenchymal damage establishing an accurate diagnosis of DPLD can be challenging for clinicians as these comprises of a heterogeneous group of more than one hundred distinct lung disorders that tend to be grouped together because they share clinical, radiographic, and pathologic features.[2]

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MATERIALS AND METHODS

This study was carried out in the department of chest and tuberculosis, Government Medical College, Amritsar. This was an observational cross-sectional study which included 50 patients who had diffuse parenchymal lung diseases and came to outpatient department or were admitted in wards.

This study was conducted after approval from the institutional ethics committee, Govt. Medical College, Amritsar. Each patient was considered for the study after taking an informed consent.

Inclusion criteria:

1. Patients with age 12 years and above, either sex having chief complaints of dyspnea & cough and bilateral diffuse shadows on chest radiography.

Exclusion criteria:

1. Patients not consenting for the study.
2. Diffuse parenchymal lung diseases cases diagnosed to have tuberculosis.
3. Patients with cardiac disorders.
4. Patients with very severe hypoxemia.

A pre-structured proforma was filled in those cases which were included in the study. Their personal data including age, sex, occupation, address, a detailed occupational history were sought out. Their symptoms, past and personal history with special focus on smoking were noted down. This was followed by their physical examination, investigations including Chest x-rays, SpO2 with pulse oximetery. Spirometeric analysis, 6 min walk test were done. The data was documented, tabulated and analyzed by using unpaired t-test and Chi-square test wherever applicable.

RESULTS

Fifty patients diagnosed as DPLD based on clinical, radiological and PFT findings attending OPD and/or admitted in Chest and TB hospital, Amritsar were included in the study. 6 min walk test was done and the following observations were made which have been depicted in tabular form.

Table 1: Desaturation at 6 MWT in DPLD Patients.

Diagnosis	Total Number of Patients	Desaturation on 6 MWT (SPo2 <88% or fall of 4% from baseline)	
		No. of Patients	Percentage
IPF	19	17	89.47
CTD-ILD	13	7	53.85
NSIP	6	4	66.67
Sarcoidosis	4	3	75.00
COP	3	1	33.33
HP	2	1	50.00
Pneumocoiosis	1	0	0.00
Metastasis	1	0	0.00
ABPA	1	0	0.00
Total	50	33	66.00

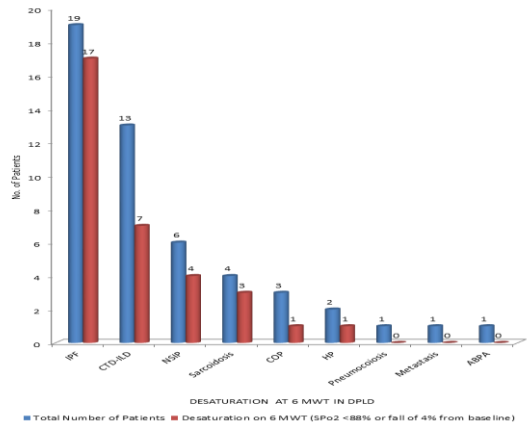

Figure 1: Desaturation at 6 MWT in DPLD Patients

Desaturation on 6MWT (SPo2 <88% or fall of 4% from baseline) were seen in total of 33(66%) patients with most cases being IPF in which 17 patients (89.47%) out 19 cases showed desaturation. This was followed by NSIP with 4(67%) of of 6 cases and CTD-ILD having 7(53.8%) out of 13 cases showed desaturation.

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DISCUSSION

The six-minute walk test (6MWT) is a practical and inexpensive test of exercise tolerance that is commonly used to stage disease and evaluate treatment responses in people with DPLD.[3,4] A reduced 6-minute walk distance (6MWD) is a predictor of mortality for people with DPLD in some but not all studies. Although the 6MWD has a significant relationship with other measures of outcome such as forced vital capacity (FVC) and diffusing capacity for carbon monoxide (TLCO) across a range of tests.[5,6]

The 6-min walk test (6MWT) is the most frequently used exercise capacity assessment for patients with chronic lung disease. Exercise tolerance assessed with 6MWT is submaximal capacity because most patients do not achieve maximal effort during the test.[7] The test itself requires an unobstructed walking path but no exercise equipment and little advanced training to administer. It evaluates the integrated global response of the pulmonary, cardiovascular, and neuromuscular systems. Therefore, it is considered difficult to provide specific information regarding which system contributes to exercise limitation, something a cardiopulmonary exercise test would provide [8,9].

The diffuse parenchymal lung diseases (DPLDs) are a diverse group of chronic lung conditions characterized by exercise limitation and dyspnea on exertion. Treatment options are limited and are frequently associated with significant risks and side effects. In this setting, it is important to know whether changes in functional status are associated with sufficient clinical benefit to warrant a change in a patient's medical management.[9] The six-minute walk distance (6MWD) is a widely used measure of functional status in people with DPLD. The distance walked is closely linked to disease severity and survival across a range of DPLDs and is an important outcome measure for clinical trials.

Most patients with IPF experience exercise dyspnoea as the first symptom and a key feature is impaired to the gas exchange that worsens with exercise. Clinical exercise testing using cycle ergometer or

treadmill protocols has been used in patients with interstitial lung diseases, and most showed a marked drop in oxygen saturation during exercise.[10] However, these forms of exercise can be unfamiliar to some patients. The 6-MWT is a simple test to evaluate desaturation; it is a more familiar form of exercise for patients and more relevant to their everyday live and can be performed even by patients with advanced pulmonary or cardiac diseases. Test is very simple, requires inexpensive equipment, and is reproducible. In addition, it is considered to be safe because patients are self-limited during exercise. The 6-MWT has been shown to have prognostic value in various forms of advanced lung disease.

The 6MWT is a widely used measure of exercise tolerance in patients with various cardiac and pulmonary diseases. From a clinical perspective, it has the advantages of practicality and safety; it requires no special equipment or advanced training, and unlike maximal cardiopulmonary exercise testing, it can be performed by all but the most severely impaired patients. Moreover, because the 6MWT is self-paced, it is better tolerated and more reflective of daily activities than other maximal exercise tests. Based on these characteristics, the 6MWT represents a clinically meaningful tool that may be particularly well-suited to the assessment of functional status in patients with IPF. To date, however, studies evaluating the performance characteristics of the 6MWT in patients with IPF have been limited by small sample size and have generally yielded inconsistent results

CONCLUSION

This study shows that persons working in petrol pumps have respiratory abnormalities in the form of restrictive lung impairment. This impairment increases as the duration of exposure at workplace increases.

Further studies in the form of Diffusion Capacity of the lung for Carbon monoxide [DLCO], other markers of pulmonary impairment like exhaled Nitric Oxide levels (FeNO) are needed to explore the effects of these toxic substances.

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How to cite this article: Rana S, Mahajan S, Kajal NC, Gupta S, Vohra S, Sugandha S, Kaur A, Randhawa D, Neki NS. Six-Minute Walk Test Outcomes in Patients with Diffuse Parenchymal Lung Disease. Ann. Int. Med. Den. Res. 2019; 5(4):TB04-TB06.

Source of Support: Nil, **Conflict of Interest:** Nil.