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**INDO AMERICAN JOURNAL OF  
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.1146814>Available online at: <http://www.iajps.com>**Research Article****PROGNOSTIC VALIDITY OF SIX MINUTE WALK TEST (SMWT) &  
RESULTANT DYSPNOEA RATING IN PATIENTS WITH PRIMARY  
PULMONARY HYPERTENSION****Rashid Ahmed Khan<sup>1\*</sup>, Suhail Ahmed Almani<sup>2</sup>, Muhammad Iqbal<sup>3</sup>,  
Hamid Nawaz Ali Memon<sup>4</sup>, Aatir H. Rajput<sup>5</sup> and Muhammad Muneeb<sup>6</sup>**<sup>1</sup>Department of Pulmonology - Liaquat University of Medical & Health Sciences, Jamshoro<sup>2,3</sup>Department of Medicine - Liaquat University of Medical & Health Sciences, Jamshoro<sup>4</sup>Zulekha Hospital Dubai, United Arab Emirates<sup>5</sup>Sir Cowasjee Jehangir Institute of Psychiatry, Hyderabad<sup>6</sup>Indus Medical College, Tando Muhammad Khan**Abstract:**

**Objective:** This study hopes to assess the prognostic validity of desaturation during a SMWT using repeated evaluation against the Baseline Dyspnea Index - dyspnea rating in patients of primary pulmonary hypertension. **Methodology:** This retrospective analysis comprised of the SMWT and dyspnea rating records of a total of 377 pre-diagnosed patients of primary pulmonary hypertension, re-approached after their initial presentation at a pulmonology specialist setting after a minimum of 1 year of initial recorded results of SMWT and Baseline Dyspnea Index and evaluated again against the Baseline Dyspnea Index and a 3 day – Mean Blood Pressure. The data obtained was analyzed using SPSS v. 21. 0 and the results used to draw a conclusion. **Results:** Among the 37 subjects, 23 were males while 14 were females. Mean age of the subjects was 43 years. The mean distance result of the SMWT was 347 m with the highest and lowest values measuring at 329 and 378 respectively. Upon re-approaching and evaluation against the Baseline Dyspnea Index and a 3 day – Mean Blood Pressure, the patients with yielded interesting results. Patients with an SMWD of more than 347, reported a subsequent mean Baseline Dyspnea Index of Grade 3 or more, while patients with a SMWD of less than 347 reported a subsequent mean Baseline Dyspnea Index of Grade 2 or less. In addition, patients with an SMWD of more than 347, reported a subsequent 3 day – Mean Blood Pressure of less than 130/90 mmHg, while patients with a SMWD of less than 347 reported a subsequent mean 3 day – Mean Blood Pressure of more than 130/90 mmHg. **Conclusion:** After careful consideration, it can safely be concluded that a mean SMWD of 337 or less is prognostic of better eventual 1 year outcome. While a SMWD of more than 337 is prognostic of worse eventual 1 year outcome evaluated against the Baseline Dyspnea Index – Dyspnea rating.

**Keywords:** Primary Pulmonary Hypertension, Hypertension, SMWT, SMWD, Dyspnea, Blood Pressure, Prognostic Value.**Corresponding author:****Dr. Rashid Ahmed Khan,**

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**INTRODUCTION:**

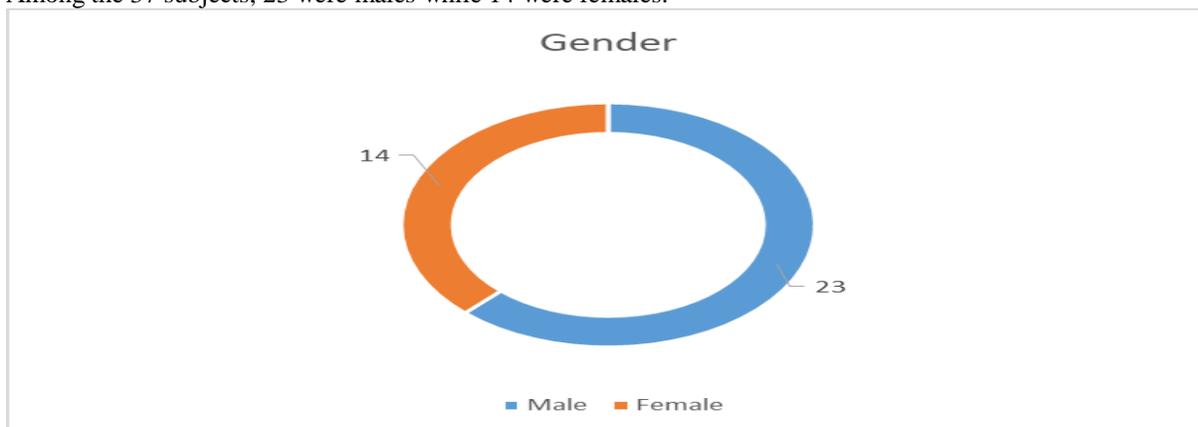
The 6-min walk test (6MWT) is commonly used for the evaluation of patients with cardiac or pulmonary diseases, as a form of submaximal exercise testing that is simple, reproducible, safe, inexpensive, and applicable to everyday activities, sensitive to therapeutic interventions and of prognostic relevance. [1, 2] Accordingly, the 6MWT has been used as a primary endpoint in most randomized controlled trials of newly developed therapies in primary pulmonary hypertension. [3]

Primary pulmonary hypertension is characterized by a progressive increase in pulmonary vascular resistance and arterial pressure, leading to right heart failure and premature death. [4-6] Exercise intolerance is the main characteristic of pulmonary hypertension. Determination of exercise capacity has an important role in the evaluation of patients. Exercise capacities measured by six-minute walk distance (6MWD) were observed to be the significant markers of survival in the French Registry. [7]

6MWT is an inexpensive and simple test, technically easy to apply, repeatable, convenient to use in large patient groups, reflects daily living activities better than laboratory tests, and is well-tolerated by patients. [8, 9] However, it has disadvantages such as its dependency on patient effort and unavailability to measure gas exchange and ventilation efficacy. [10] 6MWT is influenced by many factors including age, height, weight, gender, ethnicity, comorbid conditions, supplemental oxygen use, encouragement level, corridor length used for testing, learning effect, and mood. [11, 12]

**RESULTS:**

Among the 37 subjects, 23 were males while 14 were females.



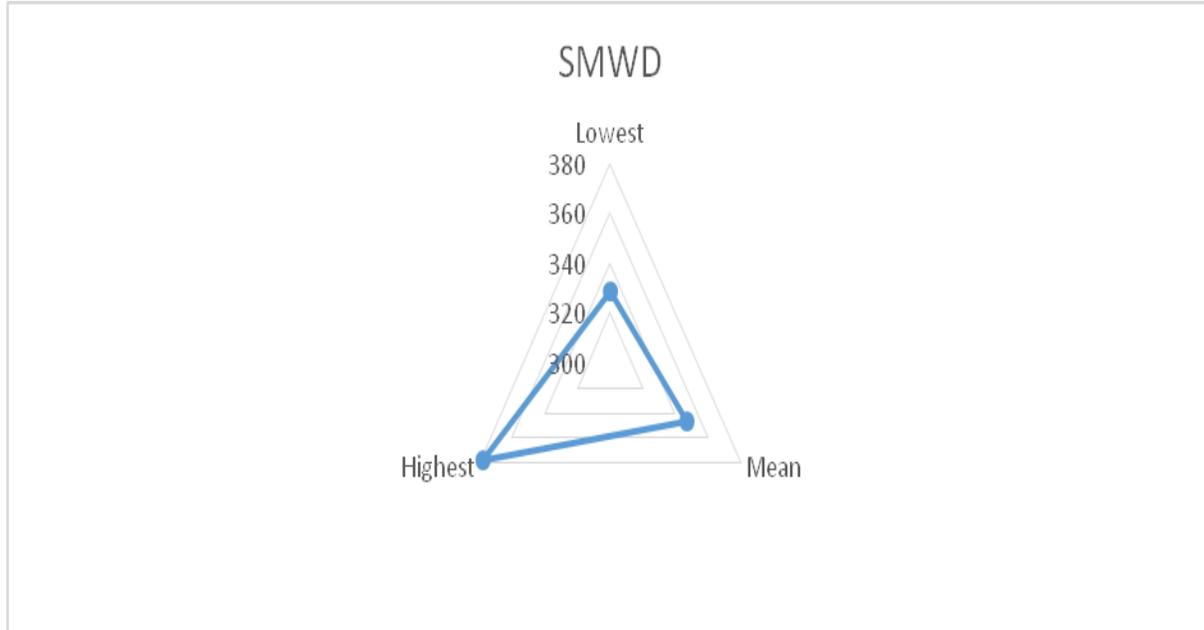
Mean age of the subjects was 43 years. The mean distance result of the SMWT was 347 m with the highest and lowest SMWD values measuring at 329 and 378 respectively.

In 2002, the American Thoracic Society published a guideline on the standardization of 6MWT. According to this guideline, the patient rests for at least 10 min prior to 6MWT, and the dose and timing of medications that the patient has been receiving are recorded. Heart rate, blood pressure, and oxygen saturation are measured. 6MWT is thus used to determine functional exercise capacity, assess treatment efficacy, predict prognosis, and establish rehabilitation programs among pulmonary hypertension patients. In our clinical set-up, the SMWT is an essential tool, however, its prognostic ability is seldom pondered upon.

This study hopes to assess the prognostic validity of desaturation during a SMWT using repeated evaluation against the Baseline Dyspnea Index - dyspnea rating in patients of primary pulmonary hypertension.

**METHODOLOGY:**

This retrospective analysis comprised of the SMWT and dyspnea rating records of a total of 37 pre-diagnosed patients of primary pulmonary hypertension, re-approached after their initial presentation at a pulmonology specialist setting after a minimum of 1 year of initial recorded results of SMWT and Baseline Dyspnea Index and evaluated again against the Baseline Dyspnea Index and a 3 day – Mean Blood Pressure. The data obtained was analyzed using SPSS v. 21. 0 and the results used to draw a conclusion.



Upon re-approaching, and evaluation against the Baseline Dyspnea Index and a 3 day – Mean Blood Pressure, the patients with yielded interesting results. Patients with an SMWD of more than 347, reported a subsequent mean 3 day – Mean Blood Pressure of less than 130/90 mmHg, while patients with a SMWD of less than 347 reported a subsequent mean 3 day – Mean Blood Pressure of more than 130/90 mmHg.

In addition to this, mean Baseline Dyspnea Index of Grade 3 or more, while patients with a SMWD of less than 347 reported a subsequent mean Baseline Dyspnea Index of Grade 2 or less. In addition, patients with an SMWD of more than 347, reported a subsequent

Grade 4	No impairment	<b>Able to carry out usual activities and occupation without shortness of breath.</b>
Grade 3	Slight impairment	Distinct impairment in at least one activity but no activities completely abandoned. Reduction, in activity at work or in usual activities, that seems slight or not clearly caused by shortness of breath.
Grade 2	Moderate impairment	Subject has changed jobs and/or has abandoned at least one usual activity due to shortness of breath.
Grade 1	Severe impairment	Subject unable to work or has given up most or all usual activities due to shortness of breath.
Grade 0	Very severe impairment	Subject unable to work and has given up most or all usual activities due to shortness of breath.

**DISCUSSION:**

Studies have revealed inconsistency between the change in 6MWD and clinical outcome. Groepenhoff *et al.* [13] reported that change in 6MWD in primary pulmonary hypertension patients after a 13-month treatment period is the determinant of survival. In another study, Benza *et al.* [14] analyzed the determinants of 3-year survival in patients treated with subcutaneous treprostinil and reported that an increase by more than 20 m in 6MWD with 12-week treprostinil therapy is associated with higher survival rates when compared with increases lower than that and that each 20 m increase in 6MWD shows a positive correlation with survival.

On the other hand, it has been reported that there is no difference between individuals with and without 112 m or more increase in 6MWD after 3-month epoprostenol therapy in terms of survival. [15] A significant increase in 6MWD was not found to be associated with a significant improvement in parameters such as time to clinical worsening. [16, 17]

Systematic reviews and meta-analysis studies that comprise randomized studies performed with primary pulmonary hypertension-specific therapies have demonstrated that a change in 6MWD and/or Baseline Dyspnea Index after treatment compared with baseline values does not determine survival benefit [18] or incidence of clinical events. [19] In a meta-analysis including 10 randomized controlled studies and more than 2000 patients that investigated whether changes in 6MWD over the course of a 12-week treatment period were correlated with clinical events, Gabler *et al.* [20] found that changes in 6MWD were correlated with treatment and clinical outcome but that it explained only 22% of the treatment effect.

In addition, they reported that a change by 41.8 m in 6MWD is associated with a significant decrease in the incidence of clinical events but that threshold decreases to 25.7 m when the patients who received prior treatment were excluded from the analysis. Researchers concluded that changes in 6MWD and/or dyspnea rating could not determine the majority of the treatment effect and may have only minimum validity as an end point for clinical events. In a new meta-analysis comprising 22 randomized controlled studies and 3112 patients, it was observed that change in 6MWD is not correlated with long-term outcomes. [21]

**CONCLUSION:**

After careful consideration, it can safely be concluded that a mean SMWD of 337 or less is

prognostic of better eventual 1 year outcome. While a SMWD of more than 337 is prognostic of worse eventual 1 year outcome evaluated against the Baseline Dyspnea Index – Dyspnea rating.

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