

The Utility Of 1-Minute Sit-To-Stand Test to Detect Exercise-Induced Oxygen Desaturation in Outpatient Assessment of Post COVID-19 Patients

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Received

15th February 2023

Received in revised form

7th June 2023

Accepted

17th July 2023

Published

1st March 2024

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ABSTRACT

Introduction: 6-min-walk-test (6MWT) is the gold standard for assessing exercise-induced impairment of gas exchange, but it is technically challenging in a busy outpatient clinic. The aim of this study was to compare the 1-minute sit-to-stand test (1MSTST) with the 6MWT in assessment of exercise-induced oxygen desaturation in post COVID-19 patients in an outpatient setting. **Methods:** A total of 447 outpatient post COVID-19 patients were recruited from post COVID-19 clinic. A set of 6MWT and 1MSTST were performed on the same day. **Results:** A total of 447 sets were performed at a mean of 160 days post discharge. Majority were in COVID-19 infection category 4 (n=251, 56%), 5 (n=118, 26%) and 3 (n=6, 15%). A total of 19% (n=89) of patients remained symptomatic (mMRC >1). There were no significant differences between nadir SpO₂ of 6MWT and 1MSTST (p=0.075). Bland-Altman plots showed good agreement between nadir SpO₂ for 6MWT and 1MSTST (Mean differences=0.028). 1MSTST could detect oxygen desaturation $\geq 4\%$ with sensitivity of 76.8% and specificity of 42.4% compared to 6MWT. There was no clinically significant SpO₂ difference during 6MWT and 1STS between symptomatic and asymptomatic patients at baseline, nadir, and recovery; the differences were <1%. However, there were lesser 6MWT distance and 1MSTST repetition between symptomatic and asymptomatic patients; 47m (p < 0.001) and 3 repetition (p < 0.001) respectively. **Conclusion:** There is a good agreement of nadir SpO₂ and sensitivity to detect oxygen desaturation $\geq 4\%$ between 6MWT and 1MSTST. 1MSTST is a useful screening test to screen exercise-induced oxygen desaturation during outpatient assessment.

KEYWORDS: COVID-19, 1-minute-sit-to-stand-test, 6-minute-walk-test

INTRODUCTION

The COVID-19 pandemic has led to an unprecedented surge in hospitalised patients with viral pneumonia. Ranging from atypical pneumonia to acute respiratory distress syndrome [1] with high prevalence of venous thromboembolic disease and pulmonary embolism, the highest mortality [1] is in the 5% treated in ICU [2]. Persistent clinical symptoms in survivors are as high as 87% [3] with protracted radiological abnormalities in 47% survivors after a mean follow-up of about 60 days post symptom onset [4]. You et al [5] recorded residual lung abnormalities including ground glass opacities (GGO) in 73% of post-COVID-19 survivors but early at a mean of 40 days after discharge from hospital. The more severe the lung injury the greater is the fibroblastic

response leading to pulmonary fibrosis [6]. The optimal time for follow-up imaging to assess for radiological clearance is not known, but current guidelines of British Thoracic Society recommend assessment at 12-week to ensure that non-resolving findings are addressed sufficiently early [7].

Post discharge assessment of these patients, especially those in more severe categories therefore has to be comprehensive and systematic. Testing methods that can be used include oxygen spirometry, lung function test and 6MWT including 1MSTST. Oximetry will elucidate immediate resting oxygenation, but exertional oxygen status requires it employed together with 6-min walk test (6MWT). The 6MWT is the gold standard exercise test and has been validated for most

