

1 Minute Sit-to-Stand Test: Possible Utility in First Contact Assessment in Patients with Covid 19

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Abstract

Background: The daily epidemiological information generated around the world reveals that COVID-19 cases continue to rise, which implies the need to optimize the detection of mild cases of SARS CoV2 infection at risk of evolving into moderate-severe cases of the disease.

Objective: To describe the usefulness of the sit-to-stand test in COVID-19 outpatients.

Material and Methods: Descriptive statistics were performed to characterize COVID-19 positive patients by PCR test, older than 18 years, both genders, who presented oxygen saturation > 90% at rest, who have been living more than 3 weeks in Mexico City.

Results: A total sample of 32 patients was analyzed, 62.5% (n = 20) were female, the median age was 39 +/- 10.9 years. Positivity to the test was found in 40.62% (n = 13).

Conclusion: COVID-19 can cause an unusual form of acute lung disease characterized by a tendency to desaturate with minimal effort with the 1-minute STS test being the most cost-effective and practical tool for outpatient application in this group.

Keywords: Pneumonia; Desaturation; Prognosis

Introduction

The daily epidemiological information generated around the world reveals that COVID 19 cases continue to rise, which implies the need to optimize the detection of cases in risk to evolve into moderate-severe cases of the disease. The clinical evaluation of CO-

VID-19 patients has undergone a process of adaptation to virtual or home care, however, any evaluation of the patient with symptoms of suspicion or confirmation of COVID-19 regardless of the environment that is carried out, must include pulse oximetry. It is known that some patients present values within normal ranges of pulse

oximetry at rest but its value decreases during physical effort. In this context, the prelude to desaturation makes it possible to precede and foresee complications in the patient whose saturation is not maintained by physical effort due to probable pulmonary complications, providing a time window to improve medical interventions and decisions, identifying patients at high risk of deterioration due to SARS CoV2 infection.

Most physical tests require laboratory space, technologically sophisticated equipment and qualified personnel to perform them, which is difficult in the first contact evaluation of newly diagnosed COVID 19 or convalescent patients. On the other hand, although field tests are cheaper, they are not used routinely due to lack of physical space (walking tests) or due to the time required for execution. Due to the above, the implementation of simple and economical functional tests in resources and time, with validity and repeatability, have become a necessity.

Stress tests applied to lung diseases have been aimed at measuring exercise capacity and focus mainly on chronic obstructive pulmonary disease and these studies were designed with the aim of long-term monitoring of the severity of chronic lung disease and its correlation with survival [1]. Field tests are used to assess functionality, balance, muscle strength, etc. For monitoring lung diseases, other exercise tests that are easy to perform, reproduce, more economic and useful have been studied in recent years, becoming a current question to be resolved: Is there an exercise test for application in the first contact of COVID-19 patient care that helps preventing complications?

The Sit-to-Stand (STS) test is generally used as an indicator of strength, balance, postural control, mobility, exercise capacity, exercise tolerance, dyspnea, quality of life, lower extremity strength, morbidity, mortality or even cognitive function [2]. In this pandemic, the 1-minute Sit-to-Stand test (STS 1min) appears to be a practical, reliable, valid and responsive alternative to measure exercise capacity, particularly when space and time are limited [3].

The shorter versions in time evaluate strength, speed and postural control. When the duration of the test is increased, power, speed, strength or endurance are evaluated. In the 1 or 2-minute versions, lactic anaerobic processes are involved and in the 3-minute versions, aerobic processes are involved. For this reason, it is considered that the different versions of test are not equivalent [4,5].

There are multiple studies that compare the STS test against the 6-minute walk as instruments for evaluating functional status, functional and neurophysiological abnormalities in COPD and healthy subjects. A strong correlation has been found in functional performance, dyspnea at rest and exercise, quadriceps muscle strength, with less stressful or similar physiological responses [6-8].

Materials and Methods

We included patients with positive SARS-Cov-2 PCR test, older than 18 years both genders, who presented oxygen saturation > 90% at rest, who have been living for more than 3 weeks in Mexico City during October-December 2020.

They received face-to-face and virtual attention where oximetry, heart rate and the 1-minute sit-to-stand test were evaluated. The patient was asked to use a firm chair that allowed a close knee and hip angulation of 90 degrees, arms crossed on the chest or without support, making a complete maneuver to stand up and return to a sitting position, repeating them as quickly as possible for a minute (Figure 1).

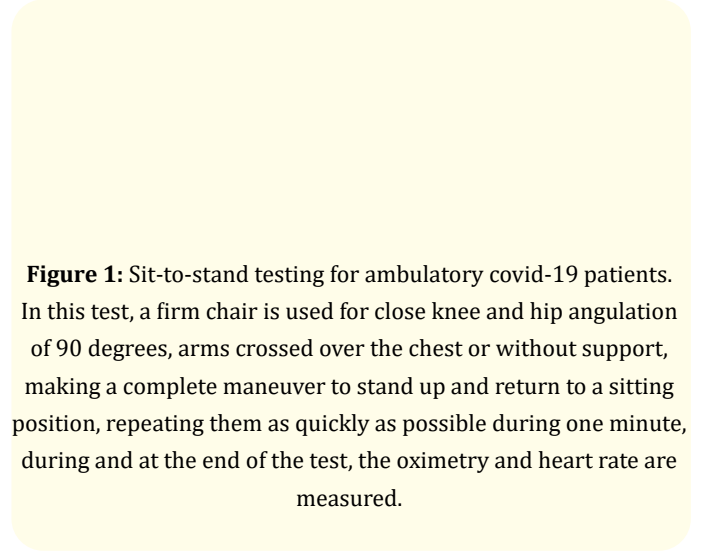


Figure 1: Sit-to-stand testing for ambulatory covid-19 patients. In this test, a firm chair is used for close knee and hip angulation of 90 degrees, arms crossed over the chest or without support, making a complete maneuver to stand up and return to a sitting position, repeating them as quickly as possible during one minute, during and at the end of the test, the oximetry and heart rate are measured.

During the test, at second 20 and second 40, verbal motivation was carried out to continue the maneuvers. Symptoms such as dizziness, dyspnea, tachycardia, diaphoresis, paleness or other symptoms of discomfort of the patient that forced the suspension of the test were constantly monitored. At the end, the oximetry and heart rate were measured again during one minute of rest.

Results

A total sample of 32 patients was analyzed. Regarding gender, 62.5% (n = 20) were female. The median age was 39 + 10.9 years. The most frequent comorbidities reported were obesity 12.5% (n = 4), hypothyroidism 9.37% (n = 3), diabetes and systemic arterial hypertension 6.25% (n = 2) and active smoking 3.12% (n = 1).

The median number of days of evolution of COVID-19 at the time of the test was 8 +/- 3.15 days.

The most frequently reported symptoms in descending order were headache 62.5% (n = 20), cough 53.12 (n = 17), fatigue and dyspnea with 46.87% (n = 15) (Graph 1).

Graph 1: Symptoms reported by outpatient COVID-19.

65.62% (n = 21) were in the initial phase of COVID-19 pneumonia.

All tolerated the STS test for 1 min. There were no eventualities during the performance and all of them met completion criteria.

Positivity to the test was found in 40.62% (n = 13). 84.61% (n = 11) were in the initial phase due to tomographic findings of COVID-19 pneumonia. See graph 2.

The median heart rate at the beginning of the test was 85 +/- 13.11 and the median at the time of recovery was 97 +/- 11.9. The median initial saturation was 93 +/- 1.8, the median after concluding the test was 92 +/- 4.5 and the median at the time of recovery was 93 +/- 2.87.

30.76% (n = 4) of the patients who had an initial positive test for COVID-19 pneumonia, at the time of the clinical follow-up test after

7 days, met the criteria for hospital admission for severe COVID-19, all female. See graph 3.

Graph 2: STS 1 min test positivity in ambulatory covid-19.

Graph 3: Hospital admission in the follow-up of covid-19 with STS 1min positive test.

Discussion

The evaluation of exercise tests has been carried out in obstructive pulmonary diseases and in interstitial disease, the latter characterized by abnormalities in oxygen diffusion, being this a mechanism shared with COVID 19 pneumonia, we consider it important to note that a drop of 3% in oxygen saturation during activity should be a matter of concern for the doctor who is evaluating the stable COVID-19 patient at home, since this desaturation on exertion will require changes in monitoring and referral to the specialist.

Currently the COVID-19 pandemic has implemented the need for the initial remote assessment of patients (telemedicine, teleconsultation), being essential that every patient in an ambulatory context have pulse oximeter at home and be trained for the correct

oximetry measurement [1]. Considering all the above, the implementation of the SIT-TO-STAND test in a home environment can be useful to detect changes in saturation while making an effort and avoid complications.

Once the 1-minute STS test is performed, monitoring the pulse oximetry for at least one minute after completing the test to search desaturation is suggested. The risk to the patient from exercise testing should be considered. It is important to advise patients to terminate promptly if they experience any adverse symptoms (severe shortness of breath, chest pain, dizziness) [1]. These symptoms are likely to be specific but not sensitive (i.e. a positive test is serious cause for concern, but a negative test should not necessarily be reassuring) [1].

To date, there are no studies in the literature that evaluate the feasibility of this test in Mexican COVID-19 patients, so this would be the first attempt to position the 1-minute STS test as a tool for evaluating ambulatory COVID-19 patients in our country.

Conclusion

COVID-19 can cause an unusual form of acute lung disease characterized by a tendency to desaturate with minimal effort, being the 1-minute STS test the most cost-effective and practical tool for ambulatory patient application.

Conflict of Interest

The authors declare that they have no conflict of interest.

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