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THE ROLE OF PHYSICAL DECONDITIONING IN CARDIOLOGICAL AND PULMONOLOGICAL MEDICAL PRACTICE

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Abbreviations
ID(T1) - Initial Dyspnea - test 1; FD(T1) - Final Dyspnea - test 1; SpO2(I) - Initial SpO2 SpO2(F) - Final SpO2; BMI - Body Mass Index; ID1(T2) - Initial Dyspnea - test 2; FD2(T2) - Final Dyspnea - test 2; C19 - COVID19

Abstract
The examination of the patient with a recent episode of C19 and residual cardiorespiratory symptoms requires a complete two-line assessment of previously undiagnosed chronic pathology. As conventional investigations were insufficient in clarifying the remaining symptomatology, it was necessary to broaden the range of investigations and to take a different approach to this category of patients.
Depending on the symptoms and the patient's general condition at the beginning of the examination, the attending physician should not disregard the period of restrictions involving significant limitations regarding exercise imposed during the pandemic. Physical exertion minimization and isolation at home have led to a series of functional disorders throughout the body, particularly cardio-respiratory, musculo-articular and neuro-psychiatric disorders.
The effects of a sedentary lifestyle or the lack of physical exertion are not limited to elderly individuals, nor to a single system or apparatus, but have undesirable consequences for the whole body. In this context, the pulmonologist was obliged to answer the question "does the patient have a previously undiagnosed chronic respiratory disease before COVID19 or is the patient physically deconditioned?". This is how the cardio-respiratory exercise test - the stair-climbing exercise test - came into play in assessing this category of patients. As the medical rehabilitation units could not cope with all the patients, it was necessary to create a home-based rehabilitation programme that was cheap, fast, and allowing telephone monitoring and quantifiable results.
Keywords: *dyspnea, Covid19, pulmonology, cardiology, low exercise tolerance, sedentary lifestyle, cardiopulmonary exercise test, physical deconditioning, respiratory rehabilitation.*



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Rezumat

Evaluarea pacientului cu episod recent de C19 și simptomatologie restantă din sfera cardio-respiratorie impune o evaluare completă pe cele două linii cu privire la existența unei patologii cronice nediagnosticate anterior. Cum investigațiile convenționale nu au fost suficiente pentru a putea lămuri problema simptomatologiei restante, a fost nevoie de lărgirea paletei de investigații și de o abordare diferită a acestei categorii de pacienți.

În funcție simptomatologie, ca și de starea generală la prezentare, medicul curant nu trebuie să piardă din vedere perioada de restricții, cu limitarea importantă a efortului impusă de perioada pandemiei. Reducerea la minim a efortului fizic, cât și izolarea la domiciliu au deteminat o serie de tulburări funcționale la nivelul întregului organismului, în special dezadaptări cardio-respiratorii, musculo-articulare și neuro-psihiatrice.

Efectele sedentarismului sau lipsa efortului fizic nu se limitează doar la indivizii vârstnici, nici asupra unui singur aparat sau sistem, ci are efecte nedorite asupra întregului organism. În contextul menționat, medicul pneumolog a fost obligat să răspundă la întrebarea: ”are pacientul o patologie respiratorie cronică nediagnosticată anterior COVID19 sau pacientul este decondiționat din punct de vedere fizic?”. Așa și-a făcut loc în evaluarea acestei categorii de pacienți testul de efort cardio-respirator, urcatul treptelor. Cum secțiile de recuperare medicală nu au putut absorbi toți pacienții, s-a impus crearea unui program de recuperare la domiciliu, ieftin, rapid și cu posibilitate de monitorizare telefonică și rezultate cuantificabile.

Cuvinte cheie: *dispnee, Covid19, pneumologie, cardiologie, toleranță scăzută la efort fizic, sedentarism, test de efort cardio-pulmonar, decondiționare fizică, reabilitare respiratorie.*

In front of the patient who recently underwent COVID19, who presents to the pulmonologist after a previous incursion to the cardiologist, accusing:

- Dyspnoea on moderate - little effort (usually the expression of patients is more plastic "I can no longer make the effort I used to do / I get tired immediately")
- Retrosternal pain - without the characteristics of heart pain (complete cardiac examination within normal limits)
- Dizziness when standing up in orthostatism
- Palpitations occurred on little effort

The pulmonologist must answer the question: Does the patient have an undiagnosed chronic respiratory disease previous to COVID19 or is the patient physically deconditioned?

Patients with respiratory conditions or those

who have gone through a longer period of total or partial immobilization, as well as a large number of healthy people, but who have a sedentary lifestyle, have more or less serious difficulties in sustaining a physical effort considered even within normal limits.

The lack of physical effort imposed by the disease or a special situation, as it was and is the period of COVID19 pandemic, with multiple movement restrictions, determined a series of functional disorders of the whole body, and especially cardio-respiratory, metabolic, musculoskeletal, neuropsychiatric, gastrointestinal, genitourinary disorders.

Regardless of age, the gradual decline in physical activity determines the onset of *the physical deconditioning syndrome*. It is based in various proportions on the age itself, the various chronic diseases acquired over the years and sedentary lifestyle or lack of physical activity. However, the lack of physical activity in itself can lead to many diseases and not just in the elderly. The effects of sedentary lifestyle or lack of physical effort are not limited to a single organ or system, but have undesirable effects on the whole body. The most important and negative effects occur in the musculoskeletal system - contractures, decreased muscle strength, hypotrophies, atrophies, osteoporosis, decreased tolerance to physical effort, etc.

To answer the question ”Does the patient have undiagnosed chronic respiratory disease previous to COVID19 or is the patient physically deconditioned?”, patients underwent biological, cardiological and respiratory evaluation.

From a cardiological point of view, the patients benefited from: clinical examination, BP and ventricular rate monitoring, ECG and cardiac ultrasound, and the final resolution was that the patients did not have chronic heart condition to explain the accusations.

From a pneumological point of view: patients were evaluated: clinically, radiologically, spirometrically, DLCO, SpO2, weight monitoring, cardiopulmonary exercise testing. The cardiopulmonary exercise testing used was climbing the stairs.

Respiratory tests performed, not identifying elements that support a chronic respiratory condition. Relevant in the study was the exercise test - climbing the stairs.

Patients with known chronic heart and respiratory conditions, patients with musculoskeletal disorders that contribute significantly to the limitation of physical activity, were excluded from the observation.

The group of patients selected for observation initially counted over 250 patients aged between 40 and 60 years. Of these, only 80 patients, meaning 32%, managed to complete the entire recommended program so that they could be re-evaluated at the end. The rest gave up from the first month, considering the program too demanding and time consuming.

Working method:

- Patients were asked to climb 60 stairs with a total height of 15 meters.
- Climbing pace - normal gait
- The target climb time was set to 60 seconds
- SpO2 was measured at the start of the exercise test and at the end of the test
- Weight monitoring at the beginning and end of the program
- The initial and final dyspnoea assessment was performed using the Borg Scale
- The exercise test was stopped in the following situations:
  1. after climbing the 60 stairs
  2. if the patient has taken a rest break of more than 3 seconds while climbing the stairs

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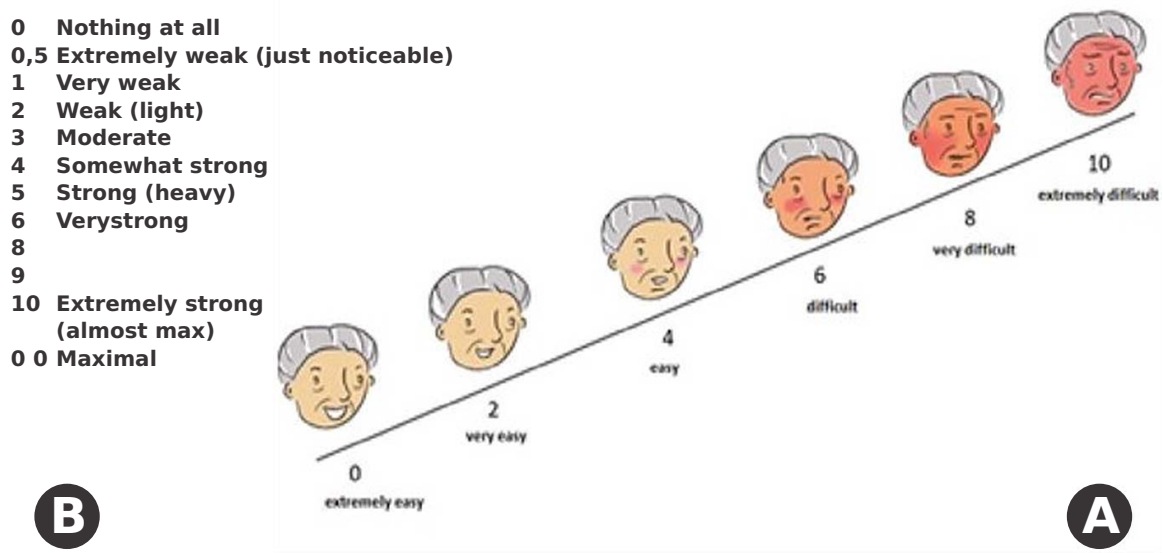

Borg Scale Source - https://www.researchgate.net/figure/A-Borg-CR10-scale-Borg-1982-37-B-OMNI-GSE-scale-Da-Silva-Grigoletto-et-al-9_fig1_340528159

3. at the onset of symptoms that did not allow the test to continue - dyspnoea, heart pain, palpitations, headache, etc.

Of the 80 patients:

- 13 patients, meaning 16.25%, managed to climb the 60 stairs in the assigned time
- 10 patients, meaning 12.5%, could not complete the test due to dyspnoea.
- 5 patients, meaning 6.25%, paused for more than 3 seconds - test stopped
- 52 patients, meaning 65%, completed the test within 60 to 90 seconds
- Initial dyspnoea ranged from 0 to 2 Borg
- Final dyspnoea ranged from 3 to 6 Borg
- In 49 patients out of 80, meaning 61.25%, a BMI above normal value was identified at the initial assessment

Following the completion of cardiac and respiratory assessments and the exclusion of a chronic cardiac or respiratory condition, a weekly physical activity program was developed for patients to follow for a period of 4 months, after which they were subsequently subjected to a new weight monitoring and new cardiorespiratory exercise testing. The increase in effort tolerance of patients admitted for observation was done in accordance with certain recommendations:

- walking in normal mode for 30 minutes at least 4 times a week for 1 month
- Walking in alert mode for 30 minutes at least 4 times a week for 1 month
- Light running for 10 minutes at least 4 times a week for 1 month
- Climbing stairs for 10 minutes in normal mode at least 4 times a week for 1 month

At the end of the 4 months of physical activity according to the mentioned protocol, the patients underwent a new exercise test - climbing the stairs and a new weight monitoring, on which occasion the following were found:

- The number of patients who completed the test within 60 seconds increased from 13 to 65. A significant percentage increase, from 16.25% to 81.25%. Significant increase of 65%.
- The number of patients who were unable to complete the test decreased from 10 to 2. Only 2.5% of patients were unable to complete the test, compared to 12.5% as it was initially.
- The number of patients who paused for more than 3 seconds during the test decreased from 5 to 0. As a percentage, we can say that in this respect we have a decrease of 6.25% compared to the initial assessment.
- The remaining 13 patients, meaning 16.25%, completed the test within 60-90 seconds. There has also been a significant decline in this area. Of the 65% that were initially at the end of the 4 months of physical activity according to the recommended program, only 16.25% exceeded the assigned time.
- Particular attention should be paid to dyspnoea and body weight at the end of the 4 months of physical activity:
  1. The initial dyspnoea (test 2) was in the range of 0 -1 Borg, compared to 0 - 2, as it was in the initial exercise test (test 1).
  2. The initial dyspnoea (test 2) was in the range of 2 -4 Borg, compared to 3 - 6, as it was in the initial exercise test (test 1).
  3. At the end of the physical activity program, the number of patients in whom a BMI above the normal value was identified decreased from 49 to 37, representing 46.25%, decreasing by 15%

The conclusions that emerge from the observation of the 80 patients who remained until the end of the program and who have strictly followed the recommendations are the following:

1. In front of a patient with a recent history of COVID19, with a cardiological and respiratory examination that does not identify elements of disease, we can consider that patients are physically deconditioned, and medical recovery is a medical act of paramount importance that directly addresses this category of patients.
2. According to the cardiological and respiratory investigations performed, the disease in all its manifestations will not only be the result of a pathological condition, but also of the maladaptation of the whole body to physical effort.
3. Physical activity performed on a well-established schedule with a gradual increase in effort can significantly improve dyspnoea and weight with a significant improvement in the quality of life of these patients.
4. Improving the mental condition by reducing the feeling of addiction
5. Increasing self-confidence through the disappearance of the feeling of fear of effort.
6. Weight loss by reducing fat tissue



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