ARENA-JPA, ISSN 2285-830X
12, pp. 128-136, 2023 , 10.62951/ajpa.2024/12/09

Descriptive study on muscular strength testing and gait assessments in patients with covid-19 in the hyperacute ward

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Abstract

The early intervention of physiotherapy applied in the rehabilitative treatment of patients presenting mild and moderate symptoms of the SARS-CoV-2 virus, in hyperacute and acute wards, becomes necessary to enhance the efficiency of multidisciplinary treatment.
The presented study was conducted on a total of 80 subjects divided into an experimental and a control group, over a staged period of 8 months during the years 2021-2022.
Investigations highlighted the fact that the specific involvement of rehabilitative physiotherapy in these types of patients, differential aspects, from the perspective of musculoskeletal functional recovery, being correlated, with the optimization of respiratory functions.
Prompt activity of the physiotherapist through the development of personalized programs according to the pathological state of the subjects resulted in the improvement of basic motor functions as well as coordinative capacities, especially of the locomotor system.

Keywords: Physiotherapeutic assessment, muscular strength, gait testing, COVID-19, intensive care.

Introduction

Globally, the functional side effects of COVID-19 infection has highlighted the necessity of early intensive physiotherapy approach. The main aim to reduce the period of hospitalization, and especially the time spent in intensive care units, where these patients often have prolonged bed immobilization due to respiratory system impairment, which most often limits the maintenance of muscular strength and consequently locomotor functions, sometimes making impossible the optimization and recovery of those severely affected by the virus.

In this context, physiotherapy may be considered a component of the process of accelerating the restoration of homeostasis, thus becoming an essential support of drug treatment, making the the recovery process more efficient. These gentle techniques lead to the effectiveness of physiotherapeutic management in ICU sections, where studies show that changing postures, specific positioning, and the earliest possible elevation of patients from

various lying positions to sitting, then to standing shortens the duration of stay in the hyperacute unit. (after Shamsi S. et. al., 2020, pp.112-115).

Correctly applied and adapted physical exercises complement the treatment scheme by maintaining and progressing muscular strength, which leads to the achievement of the final objectives necessary for returning to daily activities of living (ADL).

The above is mirrored by the following comparative results in initial testing (Ti) and final testing (Tf).

This study aims to highlight the importance of combining physical exercises with respiratory physiotherapy, applied to this type of patients, which can lead to improved lung capacity and health status, emphasizing the importance of muscular assessment and gait testing after a period of bed rest.

Methodology

The study included a total of 127 patients, of which 80 individuals diagnosed with COVID-19, were selected according to the inclusion and exclusion criteria from the experiment, admitted from the hyperacute and acute wards, where I've practiced my physiotherapy activity.

The patients were divided into two equal groups.

The physiotherapeutic protocol for the experimental group included specific exercises for optimizing respiratory function, such as passive and active mobilization, as well as specific techniques for improving muscle strength and gait reeducation.

The other 40 individuals from the control group benefited from a physiotherapeutic protocol made up of basic physical exercises, which included specific exercises of both passive and active mobilization, for improving muscle strength and subsequently walking function.

Selection criteria included: subjects between 55 – 70 years old, with peripheral saturation greater than 80%, without large doses of vasoactive medication, with a high level of consciousness, without hallucinations or delirium, having a high level of cooperation, without neurological diagnosis or result of a trauma, without contraindications to physiotherapy and mobilization, without admission to the intensive care unit for more than 7 days.

The initial and final assessments included measurements of muscle strength and walking tests, to assess the progress of each patient.

Muscle strength assessment was performed using the Oxford scale, applied segmental analysis, divided on the upper and lower limbs.

The walking tests included some very important inclusion criteria, such as the maximum O2 support not to exceed 2L/min., and the saturation (SaO2) not to be below 92%. Those with chronic pulmonary conditions were excluded from testing, as in certain conditions the SaO2 level being lower, even though the minimum necessary level of O2 support most often can be quite high and thus new medical complications can occur, for example hypercapnia. The 30-meter walking test was adapted for patients in the ICU, with low saturation, also presenting other slightly affected parameters. (Tudorache E. et. al., 2019, pp. 473-474).

Results

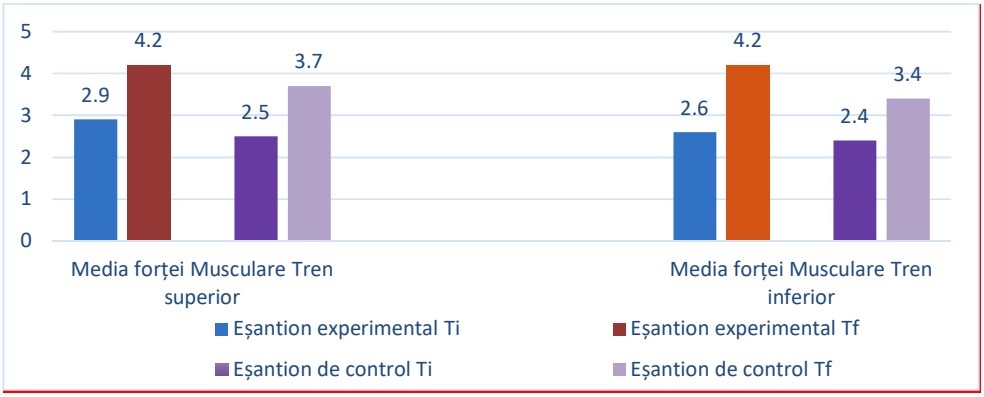
Out of the total of 80 patients, a significant number showed significant improvements both in muscle strength and in walking capacity.

The results arising from the application of the recovery program to the experimental sample reflect an improvement both in muscle strength, progress in walking tests, and respiratory functions, indicating significant functional recovery, compared to the control sample, where only basic physical exercises were applied, highlighting the efficacy of physiotherapy in the context of individuals infected with COVID-19.

We consider that the walking tests are essential in these individuals, however, due to the fluctuating health status through the symptomatic manifestations of the COVID-19 virus, the results were relevant only after covering a distance of 30m, without reference to the time it took to complete the route.

Figure 1

The arithmetic average mean of muscular strength of the upper and lower limbs, in the experimental sample and the control sample



The comparative graphic interpretation highlights the progress between the initial and final tests, regarding the average means of the results of the two groups.

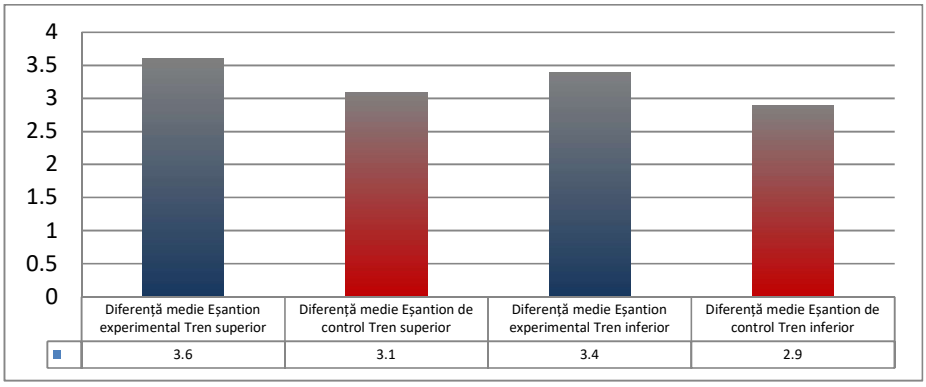
In the experimental group, we note that the average mean of the muscular strength at the level of the upper limbs at the initial testing (Ti) is only 2.9, while at the final testing (Tf) it is 4.2, registering a significant progress of 1.3. At the level of the lower limbs, Ti is only 2.6, while Tf is 4.2, registering a relatively significant progress of 1.6.

Analyzing the comparative graphs of the control group, the average mean show a poor muscular strength at the level of the upper limbs, where Ti is only 2.5, and Tf is 3.7, recording an expected progress of 1.2, taking into consideration the type of treatment applied and the testing period. At the level of the lower limbs, Ti is 2.4, and Tf is 3.4, showing a modest progress of 1.

According to the Oxford scale where the tests are done from 0 to 5, the results presented above can be interpreted as an efficiency of the physiotherapeutic program applied to the experimental group.

Figure 2

The difference in the final arithmetic means between the experimental sample and the control sample regarding the muscular strength of the upper and lower limbs.



In the comparative graph presented above, we mention that the differences in the final averages of muscular strength between the two groups show a value of 0.5 at both tests, for both the upper and lower limbs.

In the walking tests, from the experimental group, 95% of the 40 individuals (38 patients) managed to complete the 30-meter path. In the control group, 34 out of 40 individuals managed to cover the entire distance of the path, thus only 85% of those tested in this group has managed to complete the whole walk.

Discussions

Most clinical settings around the world have faced intermittent waves of hospital admissions of individuals with various manifestations of COVID-19 symptoms, leading to the need of adapted interventions, by medical staff and by physiotherapists, who operate in acute and hyperacute wards. Several studies have demonstrated the need for more specialized therapists in ICU sections, but also the implementation of new intervention programs. (Trojiman A. et. al., 2022, pp. 155-156).

The results presented in this study highlight several essential aspects, such as the importance of physiotherapy in the recovery process of patients with COVID-19, the role of segmental muscle strength assessments, gait testing, and encouraging and motivating those tested to participate in physiotherapy sessions, but also the abilities of physiotherapists to support patients in overcoming their anxiety and depression, caused by respiratory insufficiency, general weakness, and low motivation. Following the above, we can consider that the field of physiotherapy is in continuous evolution and thus arises the need for new work protocols adapted to specific needs, well-structured, demographically divided and by age categories, in order to increase the level of functional independence of the treated patients.

Recommendations

To fulfill the duties of physiotherapists working in acute and hyperacute wards, certain interventions are necessary, which we recommend in order to obtain optimal results, especially when referring to patients with symptoms and aspects similar to those infected with the COVID-19 virus:

1. Continuous assessments and testing during treatment, to identify the specific needs of each patient and to intervene as early as possible to avoid the further deterioration of major functions, by adjusting, as needed, the treatment plan.

2. Development of personalized and individualized treatment schemes, which include methods and specific techniques for the recovery of respiratory functions, applied primarily, but combined with programs for maintaining and increasing muscle strength, both at the segmental level but also at the general strength to achieve the proposed objectives, more precisely the reintegration of the treated individual into daily activity. The conscious recovery process by promoting the autonomy of motor activity, such as the possibility of becoming more independent.

3. Active participation in the multidisciplinary team on the ICU wards, where an essential role is held by the physiotherapist with competencies and abilities to recover both the respiratory system and the musculoskeletal system, being capable of intervention in critical moments, where the health status of the treated subject can deteriorate at any moment, even outside the working schedule, thus the necessity of on-call physiotherapists is important for the prevention of complications related to the area of therapeutic activity deployment. Communication, regarding integration, with the multidisciplinary team through the active participation of the members can enhance the efficiency of holistic recovery of patients from acute and hyperacute wards.

Limits of the research

We mention that this study presents some research limits, among which it is necessary to highlight the relatively small number of individuals selected, according to the mentioned criteria, and the individualization of the physiotherapeutic intervention programs, which led to a variability of result interpretations, due to the fact that we faced differences in symptomatology from one patient to another, suggesting a limitation of progress, influencing the generalization of the results.

We consider that future studies are necessary to strengthen specific intervention programs of physiotherapy in individuals with COVID-19, in order to develop a unique global methodology, in potential future patients with similar physical and respiratory manifestations.

Another limitation may be considered the separation by climate-geographical, demographic: gender and age.

Conclusions

Physiotherapy applied in acute and hyperacute wards is considered an important pillar in the treatment and management of patients with COVID-19, and by approaching new methods and specific techniques, adapted to the needs of the iterated individuals, this study tries to highlight the fact that patients from the experimental group, who also benefited from specific applied physical exercises combined with respiratory exercises, have gained a significant improvement, compared to those in the control group, who benefited only from basic physical exercises. The differences between the two groups, in terms of muscular strength, capacity, but also the quality of their gait, were visible, also reducing the stay in the hyperacute wards for those in the experimental group.

Continuous assessments contribute to accelerating the recovery process, by adjusting and readapting, as necessary, the treatment scheme, improving in some cases even the health status of the patients, reducing the negative impact of the prolonged period of bed immobilization, especially in patients from ICU sections.

Finally, we specify that taking into account the physiotherapeutic potential in the context of a COVID-19 pandemic-like situation, one can resort to a guiding methodology, according to the above-mentioned.

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