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The role of physical therapy in post-coronavirus syndrome: A pilot study

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Abstract---The aim of this study was to describe the current official guidelines issued by the World Federation of Physiotherapy and Physiotherapy Societies in various countries. It was also aimed to define the recommended procedures for respiratory rehabilitation and physical therapy for Coronavirus Disease 2019 patients (COVID-19). A pilot study was carried out for certain cases that were infected with the Corona virus within the city of Waleed -Libya in the period between October 2020 to March 2021. A physiotherapy treatment was carried involving 15 cases over a 7-day period. During the first several days of treatment, there was no much difference in the readings. However, within a few days, cases began to improve, indicating a positive response to physical therapy. On the last day of the tasks, the respiratory rate was recorded on a device (Spirometer) at the beginning of the session with 92.6 and at the end of the session with 94.6, and the numbers increased significantly, and there was a noticeable improvement in the breathing process and the almost complete removal of cough and congestion.

Keywords---COVID-19, respiratory rehabilitation, physical therapy, coronavirus syndrome.

Introduction

SARS-CoV-2, the virus responsible for COVID-19, has been stated a global pandemic by the WHO, with over 233 million documented cases and over 3.8 fatalities globally (1,2,3). Doctors have recently discovered that approximately 20% of coronavirus patients, particularly those who are hospitalized, have difficulty restarting daily activities and living even after recovery. This virus causes complications and consequences (such as breathing problems, exhaustion, and a rapid heart rate) that can continue for weeks or even months. (4). To support the measures taken to address the corona virus epidemic, 60% of patients must be treated in the Department of Pulmonology and Medical Resuscitation's pulmonary rehabilitation unit in order to assist those infected with the virus in the post-recovery stage, as well as those with chronic heart and respiratory diseases, in improving their physical and psychological condition (4).This unit relies on a multidisciplinary mechanism and provides an individualized rehabilitation program according to each patient's condition. It also has the latest cardio-pulmonary rehabilitation and assessment techniques. The unit's team includes pulmonologists, physical therapists, respiratory therapists, nutritionists, psychotherapists, and a social worker (5). Rehabilitation sessions are given for about an hour, 3 to 5 times a week, and are based on a treatment plan divided into 3 phases. It is worth noting that the treatment is not done through prescribing medications, but rather by adhering to a training and exercise program with specialized equipment (6).

In the first stage, the patient consults a physiotherapist to assess the condition of the heart, lung and muscles and develop the treatment program accordingly. In the second stage, the patient begins lung and heart rehabilitation sessions that focus on improving breathing, flexibility, ability to exert effort and endurance through exercising with machines, but under medical monitoring that includes heart rate, pressure, oxygen saturation and all vital indicators that may cause problems in the event. The exercise was not done properly. Since the body is still affected by the repercussions of the disease, the patient cannot exercise normally. Therefore, things are done in the unit gradually and the patient feels better, and is active again starting from the third week. In addition, the patient benefits from education and counseling sessions with a doctor who specializes in quitting smoking, if he is a smoker, or with a nutritionist or psychiatrist. Finally, the third phase constitutes the conclusion of the program, in which an assessment of the patient's progress and improvement is carried out prior to his departure, along with the necessary advice to maintain a good quality of life. Thus, the patient has recovered from the repercussions of the Corona virus and returned to his normal life as soon as possible (7).

Given the large cohort of COVID-19 survivors and the physical complications of hospitalization and admission to the intensive care unit, it was expected that there would be a high demand for rehabilitation to enhance recovery after infection, and as a result, COVID strategies have been published, according to an

Oxford study. However, the influence of COVID-19 on outcomes such as physical function and fitness is yet unknown, as as how these outcomes will recover over time. Given the similarities in the etiology and clinical presentation of SARS-CoV and COVID-19, patients infected with COVID-19 should have the same deficits in physical function and fitness as detailed in this study. Despite the disparities in COVID-19 infection and mortality rates among ethnic minority groups, particularly in the United Kingdom and the United States, it is unclear whether findings from the SAR-CoV literature are generalizable to all COVID-19 patients with different demographic and cultural profiles. As a result, systematic collection of this demographic data following injury should be conducted to guide rehabilitation programs by identifying groups of patients who may be at highest risk of post-infection impairment on the job (8).

While rehabilitation therapies are essential for COVID-19 patients, this review reveals a scarcity of data on the effects of exercise after a SARS infection. As a result, additional study is needed to assess the effects of exercise on patients infected with COVID-19 and establish whether exercise might aid recovery after infection. Particular attention should be made on the type and dose of exercise necessary to elicit favorable benefits following injury, as well as how exercise prescription should be changed at various time periods following injury to promote function recovery (e.g, inpatient versus outpatient rehabilitation). Furthermore, the mode of delivering the exercise should be examined to guarantee the intervention's safety and efficacy; for example, although face-to-face sessions may be necessary in certain situations to obtain the specified exercise dosage (9).

Finally, while the focus of this research was on physical function and fitness, it is crucial to examine other possible COVID-19 symptoms, such as excessive tiredness, depression, and cognitive impairment, which may affect these outcomes and rehabilitation success. Viral infection is thought to contribute to the development of chronic fatigue syndrome, and it is predicted that 65 % of persons who were infected with SARS-CoV fit the diagnostic criteria for CFS. Hence, people infected with COVID-19 may similarly suffer significant levels of post-infection tiredness. Chronic psychological disability such as depression and post-traumatic stress disorder, in addition to cognitive dysfunction such as delirium, may emerge during critical illness and intensive care unit care. As a result, future research should assess the effects of COVID-19 across psychological and cognitive domains and determine how these findings affect physical function recovery. These findings can then be used to inform the design and delivery of tailored rehabilitation interventions that consider the impact of symptoms such as fatigue on recovery (10,11).

Methodology

This was a Quasi-experimental pilot study which examined the role of physical therapy in post-infection syndrome with coronavirus. This study was carried out to evaluate the extent of the effect of physical therapy exercises to improve breathing functions in patients suffering from this syndrome. This study enrolled cases suffering from post -corona syndrome and suffering from lung problems within the city of Bani Waleed, Libya. The samples were selected according to the

priority and regularity with physical therapy exercises. Inclusion criteria included 15 cases suffering from post-Corona syndrome, with age raged between 18 and 65 years old. Patients having a history of comorbidities and those who got irregular treatment were excluded. As a result, the final sample size was 10 cases. The treatment period was from October 2020 to March 2021.

Study Implementation Steps

This study was conducted on patients with post-Corona syndrome and the treatment included a home visit within the city of Bani Waleed, and the physiotherapy program was implemented. It was performed and presented to 3 physiotherapists and a doctor specializing in chest diseases, in order to get the best results, and it was approved after adjusting some points. There was also a special program for one of the cases due to her health condition and her inability to perform some exercises.

Data Collection Tool

The data related to the subject of the study was analyzed using the statistical analysis program (Spss) version 25. Data was divided into two stages:

- Stage 1: which includes measuring the conditions before exercise three times according to the correct protocol for using the Spirometer.
- Stage 2: which includes measuring the cases after the exercise according to the correct protocol, and the measurement was carried out in three stages, taking enough time to rest between each operation.

Study Data Analysis

Table1 showed the daily respiration of the cases. Before treatment, the respiratory rate is measured, and after treatment, the respiratory rate is also evaluated to see how well the cases respond to treatment. To test the hypothesis of two correlated samples, we use the Wilcoxon test (indicator-rank test). We refer to the morale of the test, not less than 5%, according to what is shown in the table (1).

Table 1
Statistical analysis to measure the respiration of cases daily before and after treatment

MEAN	after1 day 1 day ago	after1 day 1 day ago	after1 day 1 day ago	after1 day 1 day ago	after1 day 1 day ago	after1 day 1 day ago	after1 day 1 day ago
Z	.000b	-1.414c	-1.518c	-1.633c	-2.000c	-2.121c	-2.041c
Asymp. Sig. (2-tailed)	1.000	.157	.129	.102	.046	.034	.041

Figure 1 depicts the general outline of the cases that were controlled. It also indicated how the clinical trial was conducted, over a whole week, The numbers after taking the exercise were observed on the first day, a record of 87.4, which is

the average percentage of the cases studied in the clinical trial. The agreed protocol of breathing exercises was performed to strengthen the diaphragm and the rest of the muscles. Hydrotherapy was used for cases with a slightly high temperature, and the focus was on strengthening As we explained, a program is designed for each patient according to his ability.

It was observed after taking the readings from the devices and numbers after the end of the first day's program, and we did not find a significant change in the readings. There are several reasons to explain these changes, including cases of fatigue for some cases and cases that were unable to complete the program. Therefore, another program has been designed with less effort for critical cases, in which the first case is taken into account to take the largest amount of calibration. On the second day, the same protocol regulating the study program was carried out. The average case was recorded on the first day, 87.4, as shown in Figure 1. A slight improvement was recorded at the beginning of the second day, which is 88.2, before the actual start of the program. Taking into account that I am one of the cases for which a special program was made.

The readings were taken from the monitor after the end of the program for the second day, The statistical program showed a slight increase in the numbers of recording (88.6). This indicated an improvement in the cases and the ability to complete the protocol with a noticeable increase in the numbers. On the third day, cases were recorded at the beginning of the day 88.6. When looking at the readings of the planned schedule before and after exercises, we notice a remarkable relative increase in the response of cases to the program set after the end of the exercise. No. 89.6 was recorded, which is a jump in the numbers shown, the fourth day starting with recording a statistical average of 90.4 cases before. The exercises with recording a jump and a clear response to the therapeutic course, and upon completion of the exercises, a statistical average of 91.2 cases was recorded. There was also an improvement in the response of the cases and the breathing process was better than the beginning of the first day. In addition, results revealed an increase in the minutes of sessions due to the response of the cases. On the fifth day, recording started at 90.8 and 92.4 at the end of the day. Furthermore, reading of the sixth day, began at 91.6 and ended at 93.4. On the last day of the exercises, reading was recorded at the beginning of the session at 92.6, and it ended with 94.6. The numbers rose significantly indicating a sharp improvement in breathing and almost disappearance of cough and phlegm (Figure 1).

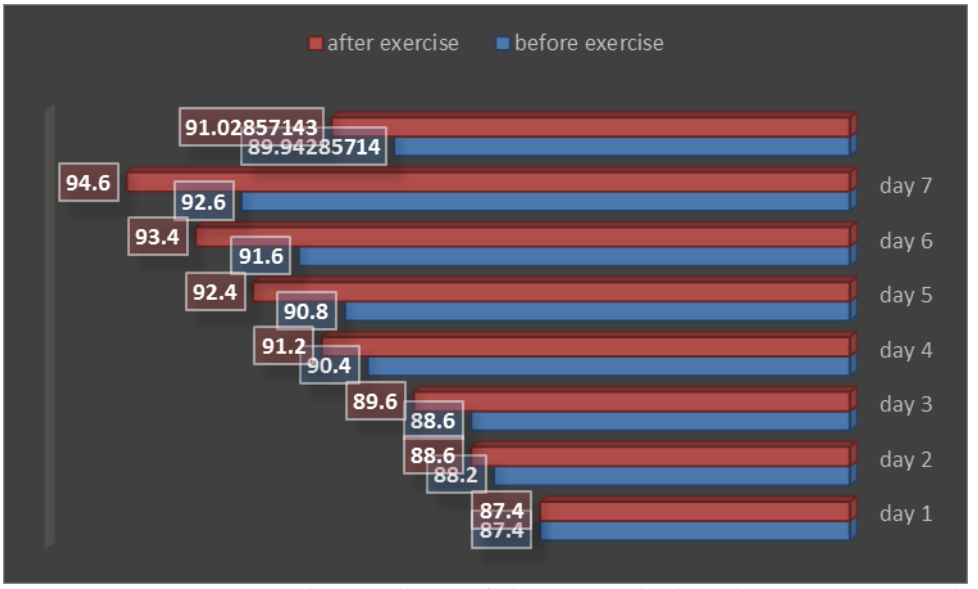

Figure 1. The change in the readings of the cases during the treatment period

Upon completion of the monitoring of vital devices, cases of breathing, shortness of breath, and any other health symptoms, reports were prepared for each day at the start. This was done in order to take care of referrals and to avoid any health or psychological problems. Although the new corona virus did not exist for more than two years, it could not be included in a scientific way in this research. The fundamental evidence should prove the effectiveness of any type of treatment. There is a clear role for physical therapy for the different stages of the disease, as well as for its various symptoms. taking into account the with all precautionary measures to prevent the transmission of infection to the doctor and from him to others, therefore, based on this principle, we tried to search for cases infected with the virus and fully recovered from it, to conduct physiotherapy sessions for such cases, to identify the role that physical therapy plays in the rehabilitation of the injured.

It is common knowledge that physiotherapy sessions should not be performed in response to a noticeable rise in temperature. A good example is treatment of post-viral syndrome using a physiotherapy. In each stage of this syndrome, an appropriate different physiotherapy method was applied. If there is a high temperature, hydrotherapy can be used. As for the different parts of the body or immersing the whole body underwater, with emphasis on taking measures to prevent the transmission of infection, which helps to reduce the temperature and reduce symptoms. There are cases that are not accompanied by lung secretions or phlegm, but we also found cases accompanied by phlegm in the lungs, which contributes to difficulty in breathing. In this case, the role of physical therapy is to teach the patient the way to correct his cough. This will be carried out by taking a deep breath from the nose and then put the tip of the tongue touching the upper jaw. This will help to open the trachea and exhale from the mouth with a cough, and phlegm cough always done by inhale through the nose and exhale from the mouth and calmly.

One of the methods that were applied to the cases, is performing a manual treatment on the patient's chest and back in specific ways. Then placing the patients in different positions, according to the places where the sputum collected, based on the x-ray, and the cityscape examination. In this case, the patients could be emptied of these secretions by sitting or relaxing on the back or one of the sides or other modes. if there is no phlegm, we do breathing exercises to strengthen the diaphragm muscle and the rest of the muscles that help breathing, and helps to overcome the obstacle of difficulty breathing. Overall, this study was launched (Quasi-experimental Research) to find out whether physical therapy has a role in the rehabilitation process after infection with the Corona virus. This study also aimed to determine a direct or indirect effect of physical therapy in the rehabilitation process, based on that a special treatment program. This study was designed under the supervision of physiotherapists and clinical trials were conducted on volunteer cases. It was found that the treatment program has a major and very effective role in the hospitalization process and a marked improvement in an ascending order in the vital signs of the respiratory system. Bearing in mind that each case was dealt with separately and based on Medical reports. The exercise program for cases was designed based on the clinical situation of each patient, despite the poor logistical capabilities.

Conclusions

We summarized the findings as follows

- The physical therapy program for post-Coronavirus patients, the rate of each patient should be according to patient's vital functions.
- The effect of physical therapy exercises has resulted in a remarkable improvement, especially on the fourth day and onwards.

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