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Review Article

The Role of Rehabilitation in Individuals with Coronavirus COVID-19: A Comprehensive Review

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Abstract

Introduction: The etiopathogenesis of COVID-19 is unacknowledged. Each individual responds different to COVID-19 and the approach for treating this disease is multidisciplinary. To analyze the possible contribution of each rehabilitation stage of COVID-19 surviving individuals including quarantine, hospital settings and isolation. We performed a literature review in order to identify studies that have analyzed the role of rehabilitation in individuals with COVID-19.

Methods: We used the keywords "physiotherapy and COVID-19" or "physical rehabilitation and COVID-19" or "physiotherapy and patients with coronavirus" or "physiotherapeutic treatment of the patient with COVID-19".

Results: For adults quarantined at home, physical therapy should be mandatory. In most individuals with COVID-19, complications and disabilities could be prevented with physiotherapy. When isolated with COVID-19, the use of remote electronic devices for consultation and education can be very useful. Finally, physiotherapy in individuals who survived COVID 19 is of great importance to help them re-integrate into their daily lives.

Conclusion: Physiotherapy has a positive role in individuals with COVID-19 and/or those who survived it. Therefore, it is necessary to sensitize the medical team and provide physiotherapy to individuals with and COVID-19.

Keywords: COVID-19; Rehabilitation; Coronavirus; Rehabilitator

Introduction

In December 2019, in the Wuhan Hubei province of China, a new outbreak of coronavirus (2019-nCoV) pneumonia emerged, which was later called Coronavirus Disease-2019 (COVID-19) [1]. On March 11 2020, the World Health Organization (WHO) declared the coronavirus as a global pandemic due to the increase in cases >118,000 reported up to then in 110 countries and the latent risk of spreading this new disease [2]. This disease mainly affects the respiratory tract and although the majority of cases present a slight or moderate evolution, 5 to 10% can have a serious and life-threatening course. Worldwide and up to today, there is no specific and effective antiviral treatment for those affected with the new coronavirus [3]. Despite the relevance of COVID-19 and

the emergence of a new global pandemic, few studies have been published on the management of physical therapy in individuals infected. The present work summarizes the most recent and relevant information published on health/scientific databases up to May 2020. Thus, the objective of this article was to address the importance of each rehabilitation stage of COVID-19 surviving individuals in quarantine, hospital setting and isolation.

Materials and Methods

Literature search

We performed a literature search in order to identify studies that have analyzed the role of rehabilitation in individuals with COVID-19. An exhaustive bibliographic search was conducted independently by two reviewers (RGCA and TBGC) up to the beginning of May 2020, using the electronic databases PubMed, EBSCO and Scopus.

The search was performed included the keywords: "physiotherapy and COVID-19" or "physical rehabilitation and COVID-19" or "physiotherapy and patients with coronavirus" or "physiotherapeutic treatment of the patient with COVID-19" and multiple combination between them. One research supervised this search and solved any doubts (CATZ).

Eligibility

We included all the articles available without language restriction, in order to access all publications and updated information on the management of individuals with a coronavirus infection that included physical therapy. Therefore, we included manuscripts that had been published less than five years ago. Finally, were excluded manuscript that reported treatments with acupuncture, chiropractic or alternative medicines [4,5].

Results

COVID-19 characteristics

Coronaviruses are pleomorphic and enveloped viruses; they have a positive-acting, single-stranded, non-segmented ribonucleic acid (+ssRNA) as nuclear material [6]. They are characterized by a crown-like structure, where the peaks are made of heavily glycosylated protein S (viewed from electron micrographs). Virus replication takes place in the cytoplasm of infected cells that emerge into cytoplasmic vesicles of the endoplasmic reticulum and cause cell death and destruction [7]. COVID-19 is caused by a single-stranded RNA virus of an approximate size of 60-140 nm (SARS-CoV-2) [8].

COVID-19 is a respiratory disease that was classified after the isolation of Broncho Alveolar Lavage Fluid (BALF) extracted from patients with the pathology [6]. It belongs to the β-Coronavirus genus (subgenus sarbecovirus, orthocoronavirinae subfamily) that are highly pathogenic and cause respiratory diseases in humans and gastroenteritis in animals [6]. COVID-19 is associated with several bat coronaviruses, as well as with severe acute respiratory syndrome (SARS-CoV). Compared to MERS-CoV and SARS-CoV, COVID-19 spreads faster from person to person [9]. In this regard, it is known that these viruses cause hepatic, enteric and neurological diseases, but most importantly, respiratory diseases [10].

Signs and symptoms

COVID-19 mainly affects the human respiratory system, the most common symptoms include cough, fatigue and fever. Less common symptoms include headache, lymphopenia, dyspnea, diarrhea, hemoptysis and sputum production [11]. Most studies suggest that adults of about 55 years of age and older are predisposed to COVID-19 [12].

Transmission

COVID-19 is primarily transmitted through exposure and contact. First, by direct exposure to respiratory secretions expelled by an infected person via sneezing, a runny nose or large drops of cough, which remain in the air for up to 3 hours; then, those secretions can reach mucous membranes of eyes or be inhaled by another person. On the other hand, manual contact with contaminated surfaces can also transmit COVID-19; it has been shown that the virus remains up to 24 hours on hard surfaces and 8 hours on soft surfaces, if those surfaces are in contact with the nose, mouth or eyes, transmission can occur [13].

Comorbidities

Individuals with COVID-19 and other comorbidities, have a less favorable prognosis, higher risk of complications and death. In this regard, it has been described that advanced age and underlying chronic diseases such as hypertension and diabetes may aggravate the evolution of COVID-19. These individuals can develop hypoxemia and dyspnea in a relatively short period, which can rapidly complicate and develop Acute Respiratory Distress Syndrome (ARDS) [14]. The average time from the onset of symptoms to developing pneumonia is five days, while for severe hypoxemia and admission to the ICU is 7-12 days [15].

Protective equipment on COVID-19

The medical team is at imminent risk of COVID-19 contagion and physical therapists are not excluded; therefore, the use of personal protective equipment is imperative, which includes scrub hat, clear face visor, single use disposable non-latex gloves, protective Kevlar or neoprene cut-resistant under-gloves, waterproof gown covering the whole body and forearms (typically a surgical gown), surgical scrubs, plastic apron, rubber boots with metal toecaps; additionally, it is suggested to use a whole-body suit a flat and molded folding protective mask [16].

Rehabilitation in patients with COVID-19 in the hospital setting

The objective of rehabilitation in hospitalized patients with COVID-19 is to prevent complications and disabilities, as well as to decrease their dyspnea, anxiety, depression, and increase their function and quality of life.

Physical therapist can use a) techniques to facilitate the elimination of secretions: assisted cough and suction of the respiratory tract; b) airway clearance techniques: percussion and vibrations, active breathing cycle, positive expiratory pressure therapy and mechanical insufflation-exsufflation, manual and/or ventilator hyperinflation and positioning; c) non-invasive ventilation and inspiratory breathing with positive pressure [17]. Similarly, positioning, mobilizations and stretching can be used to avoid the negative consequences of prolonged rest [18].

Early-onset pulmonary rehabilitation is not recommended in hospitalized patients in severe and critical conditions [19]. Extreme caution should be exercised with tracheostomized patients, especially when holding the cannula during any passive movement made by the patient, in order to avoid air leaks from the stoma and promote contamination media [20]. Similarly, the following pulmonary rehabilitation techniques may not be recommended during the acute phase, depending on the clinical situation of the patient: manual mobilization/stretching of the rib cage, bronchial hygiene/lung re-expansion techniques, diaphragmatic breathing, incentive spirometer and pursed lips breathing [21].

The respiratory and cardiovascular criteria for initiating respiratory rehabilitation in critically ill patients are: oxygen saturation >90%, respiratory rate <30 minutes, PaO2 / FIO2 ratio> 300, mechanical ventilation with stable pattern, electrocardiogram without data on ischemia or arrhythmias, heart rate <50% of maximum heart rate for age, blood pressure variability <20% when starting rehabilitation. Some laboratory criteria that must also be met are: platelets >20,000 per mm3, hemoglobin >7 g/dl, leukocytes between 4,300-10,800 per mm^3 [18].

Decisions must always be made by a multidisciplinary team, implementing measures for the benefit of patients and avoiding the spread of COVID-19 among the medical personnel involved. On the other hand, post-COVID-19 patients with sequelae will be ideal candidates for rehabilitation. Therefore, it is a priority to carry out comprehensive rehabilitation management that benefits and improves the quality of life of the patient, which allows the return of the activities of daily living as soon as possible. In this sense, the extensive updated immunological, clinical and epidemiological evidence confirms that pulmonary fibrosis (lung disease with progressive fibrosis) is the main sequel that affects survivors of COVID-19 after their recovery and, due to this, produces a pulmonary dysfunction and a decrease in quality of life [22]. The rehabilitation of these patients should include a good control and a thorough evaluation, systemic exercises, airway clearance techniques, and inhalation therapy (if applicable). Likewise, in patients with acute exacerbations and increased secretions, more frequent sessions of airway clearance techniques will be performed [23]. Finally, immediate rehabilitation management will be carried out, as it has been applied in other countries like in England [24].

Rehabilitation in isolation in COVID-19

Individuals who tested positive for COVID-19 who are stable but in isolation, should start an early rehabilitation program with basic measures of respiratory physiotherapy and mobilization exercise to avoid the negative effects of disuse. With the support of internet technology, rehabilitation programs can be installed in electronic devices and remote consultations or educational videos can be access; additionally, physiotherapeutic advice is also suggested, maybe through the preparation of triptychs, instruction sheets and brochures, in order to reduce equipment costs protection and to prevent the spread of COVID-19.

In order to do so, it is important that these individuals are clinically stable and have a good state of consciousness; other clinical criteria include absence of pain or excessive fatigue, stable emotional state and can follow safety guidelines to carry out the rehabilitation program [18,25].

Tele-rehabilitation in individuals who survived COVID-19

Tele-rehabilitation is an option that facilitates the continuity in physiotherapy treatment and assistance to patients during the health contingency due to COVID-19. It represents a good option for those who have access to internet technology, as it gives the option of exercising at home following the guidance of professional physiotherapy personnel, in group or a personalized way, and adapted to the patients' needs and objectives. Rehabilitation in individuals who survived COVID-19 is essential to minimize complications, sequels and possible disabilities; however, it is difficult to access/provide physiotherapy in ICU; therefore, in order for these individuals to return to their functions and daily life activities, it is important to initiate rehabilitation as soon as they go back to their homes [26-28].

Rehabilitation in adults in quarantined by COVID-19

Individuals who are already in rehabilitation processes and are confined to quarantine, should be motivated to continue with their rehabilitation program established in the last session [29]. These individuals need to know that they have to be physically active and carry out exercise programs according to their needs, abilities and objectives proposed for each patient. Multicomponent exercise programs that involve aerobic resistance training, strengthening, flexibility, coordination and balance are recommended, they have to be individually prescribed, using the

variables of volume, intensity, frequency and duration [30,31].

Regarding volume, international guidelines recommend doing at least 150 min / week of physical activity with moderate to vigorous intensity or approximately 450-900 METs min / week [31,32] , with a frequency of 5-7 days / week [33].

For aerobic resistance training, it is suggested to increase the frequency of sessions up to 5-7 days / week with an adaptation in the moderate intensity of the exercise (65-75% of the maximum heart rate or 40-60% of reserve of heart rate) and a volume of 200-400 min / week. Likewise, for strengthening programs it is suggested to be carried out a minimum of 2-3 days / week. Similarly, exercises that include balance, mobility, and coordination should be performed daily [34].

Conclusions

Health professionals who respond to the coronavirus pandemic are the first line of patient care. Rehabilitation clinicians have an important role in implementing techniques and procedures of physiotherapy for increasing life expectancy and face challenges such as prevention of complications, future disabilities and sequelae in individuals with COVID-19; therefore, rehabilitation is essential and the use of internet technology and electronic devices are helpful tools to assist individuals with isolation and for those who are in the recovery period or prone to illness. Then, it is necessary to sensitize the population and health personnel on the role of physical therapy in individuals with COVID-19.

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