
Review

The Impact of Physical Therapy on Patients with and post COVID-19

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Abstract

Novel coronavirus, also known as SARS-CoV-2, was first discovered at the end of the year 2019. Since then, it has affected 124 million people and caused the death of 2.73 million people around the world. This viral infection damages the lungs, making it difficult to breathe. Along with medical management, physical therapy has shown immense improvement in patients suffering from COVID-19. Respiratory therapy and manual mobilization therapy provided under the established guidelines have proven to be effective to increase lung capacity, treat dyspnea and prevent muscular weakness in hospitalized patients. More research is required to establish further guidelines.

Keywords: physical therapy, COVID-19, rehabilitation, Chest physiotherapy

Introduction

Coronaviruses (CoV) are known as the largest RNA viruses. They range from 65 to 125 nm in diameter. The nucleic acid genome of coronavirus is a single-stranded RNA and ranges between 26 to 32 kb in length [1]. Six various forms of coronavirus that caused diseases in humans have been found since 1960. This newly discovered SARS-CoV-2 is the seventh one [2]. While the previous cases of Coronavirus were less infectious and were mainly associated with mild symptoms, SARS-CoV-2 causes much more severe consequences that might potentially lead to fatal scenarios [3]. Globally, the infection that is caused by SARS-CoV-2 is known as Coronavirus Disease 2019 (COVID-19). The world is struggling against this deadly virus and the management is predominantly supportive and symptomatic amidst the absence of validated antiviral drugs. Fever and cough are the primary symptoms of COVID-19 case [4]. Some patients with respiratory distress also require supplementary oxygen supply due to the decreased oxygen saturation [5]. Along with the medical treatment, pulmonary rehabilitation is also important when COVID-19 positive patients. Pulmonary rehabilitation is defined by the American Thoracic Society/European

Respiratory Society as a comprehensive intervention regime that involves patient assessment, followed by the tailored therapies for patients including exercise training and education to improve the physical and respiratory health of patients with respiratory disease [6]. In case of COVID-19 patients, pulmonary rehabilitation aims to alleviate symptoms of dyspnea and anxiety, reduces complications, limits disability, and improves the overall quality of life [7]. Therefore, physiotherapy plays a crucial role in the treatment of patients, whether it is during critical care, inpatient departments, follow-ups or at home [8]. Here are a few treatment approaches used by the physical therapists i.e., Deep breathing exercises, Mechanical airway clearance, Bronchial hygiene techniques, Active movement of extremities (both upper and upper), chest oscillations, Flutter device and Cornet devices along with Non invasive ventilation, High flow nasal cannula, and conventional O₂ Therapy. These maneuvers help loosen up the mucus, reduce the load from mechanical ventilation and improve breathing. Despite the important role and the impact of physical therapy when treating critical patients, its importance remains overlooked. Little literature is available on the guidelines regarding implementation of physiotherapy practices and its impact on the patient's health. The objective of this review article is to extract information from the already available literature and assemble it all to find the impact of physical therapy on patients who are currently affected by COVID-19, as well as to see its impact on the patients that have already recovered from COVID-19. In conclusion, the fundamental rationale of writing this review article is to make a readable synthesis of the best literature sources on an important research topic. All the data available in different studies will be assembled in one single literature review.

Material and methods

The present review was conducted and reported in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for systematic reviews and meta-analyses (Figure 1). The figure clearly states 4 phases which are: Included, Eligibility, Screening and Identification on how the study was carried out.

Firstly, records identified through database searching (n=50) along with additional records identified through other sources (n=10). Next, after carefully removing the duplicates (n=40), the screening starts (n=30) along

with exclusion (n=10). As moving along to eligibility phase which is fairly important, we are left with the studies that are included in qualitative synthesis (n=8).

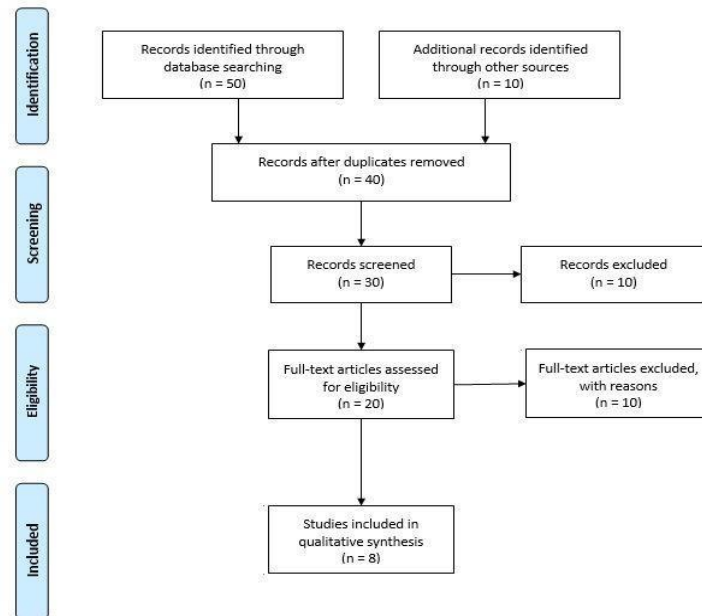


Fig. 1. Search strategy for the review

Search strategy

Several articles from PubMed, Medline, Pedro, Central, Scopus and Google scholar databases were reviewed from 2019-2021. The following keywords: Physical Therapy, COVID-19, Coronavirus, respiratory therapy was used in combination or individually by using Boolean operations "OR" and "AND". Only completed studies published in English focused on Physical Therapy as a treatment intervention for patients currently suffering from COVID-19 or those who recovered from COVID-19 were included in this review. Firstly, the titles and abstracts were screened for relevant studies, and duplicates were excluded. Secondly, the full texts were downloaded and assessed for eligibility. The reference list of included publications was hand searched for additional relevant studies. This process was carried out independently by Xhorxhina Peshku. Any difference was resolved by consensus.

Study selection

Inclusion criteria:

The inclusion criteria for the studies were as follow:

1. The studies were either randomized controlled trials (RCTs), cluster randomized controlled trials (CRCTs), or controlled clinical trials (CCTs), where the physical therapy group was compared to any control group.

2. The studies that evaluated physical therapy intervention for COVID-19 (any training duration and treatment setting, with and without adjunct treatment).
3. The studies that were conducted on human participants affected from COVID-19.
4. Participants with age greater than 18.
5. The studies that were published in peer-reviewed academic journals or conference proceedings.

Exclusion criteria:

1. The studies published in any language other than English.
2. Studies for which the full text was not found.
3. Technical papers.
4. Clinical trials not completed yet.

Study quality assessment

The included studies were assessed using Robins-1 tool 11 (McGuinness & Higgins, 2020).

Data collection

Year of publication and author's name, type and place of intervention, description of intervention, outcomes and result of the study were extracted.

Results

Following eight studies, the results of these studies

Table 1. Summary of Review articles

Author's name	Study type	Description of intervention	Place of intervention	Outcome
Arora, Jain, & Khare, 2020 (10)	Systematic Review	Mucus removal technique (endotracheal suctioning and manual thorax percussions) Chest physiotherapy (percussion, vibration, postural drainage for bedridden, active breathing exercises)	In patient department	Reduces potential pulmonary and systematic complication Low chance of developing Hospital infection
Battaglini <i>et al.</i> , 2020 (11)	Review Article	Chest physiotherapy Prone positioning Active cycle of breathing exercises Neuromuscular drainage	In patient department	Improved long term respiratory function
Kalirathinam, Guruchandran, & Subramani, 2020 (12)	Review article	Neuromuscular electrical stimulation Postural drainage Mobilization Bronchial clearance technique	In patient department	Improving mucus drainage Respiratory muscle strengthening Preventing disability
Kachpile, Lohakare, Jiandani, & Salagre, 2020 (13)	Case report	Prone position for 15 minutes to 30 minutes, 3-4 times/day. Posterobasal segmental breathing exercises proprioceptive neuromuscular facilitation Body mobility exercise	In patient department	Lung expansion mproved chest mobility 99% oxygen saturation upon discharge from hospital
Liu <i>et al.</i> , 2020 (14)	Randomized control trial	2 sessions/ week for Six-week of respiratory therapy	Inpatient and outpatient	Improved respiratory function. Respiratory muscle training
da Silva e Silva <i>et al.</i> , 2020 (15)	Original Article	Secretion removal technique, directed cough and chest oscillations, Mobilization 2-3 times a day for first three days. 3-5 minutes progressing according to tolerability	In patient department	Treating functional limitations Improves aerobic physical performance
Vitacca <i>et al.</i> , 2020 (16)	Positional paper	Chest Physiotherapy Limb mobility exercises	Inpatient department	Reduction of dyspnea Training of skeletal muscles
T. J. Wang <i>et al.</i> , 2020 (7)	Analysis	Airway clearance technique (lung volume recruitment, positioning, forced expiratory maneuver) Mobilization	In patient and home rehabilitation	Improve symptoms of dyspnea, Minimizing disability

have been reviewed. A summary regarding the intervention used, and the impact of the physical therapy intervention on the improvement of COVID-19 patients' health is mentioned in table 1.

One of the eight studies was a randomized controlled trial, one was a systematic review article, two of the studies were review articles, one was a case report, one was original article, positional paper and analysis report. Positive outcome was recorded from all the studies regarding use of physical therapy for respiratory management in patients with COVID-19.

Discussion

Not all of the reviewed articles have directly assessed or monitored the impact of physical therapy on COVID-19 patients, but the information regarding the effectiveness of rehabilitation is being extracted from them. Currently, very limited evidence exists showing that chest physiotherapy should be administered and proved effective in the acute phase of the disease in patients with hypoxemic respiratory failure. However, patients with productive cough may benefit from maneuvers that could stimulate coughing [17]. Patients who are

suffering from COVID-19 and are facing deteriorating physical conditions, such as reduced exercise capacity, dyspnea, fatigue and myalgia might also benefit from the respiratory physiotherapy [17] (Huang *et al.*, 2020). This is due to the fact that prolonged hospitalization and decreased activity level reduce muscle strength and cardiorespiratory capacity [18]. Therefore, patients should be encouraged to perform functional and breathing exercises while monitoring their vitals. Those patients who cannot carry an active lifestyle, must be aided. Classically critical patients show reduction in duration of mechanical ventilation and hospital readmissions who underwent early mobilization [19]. Therefore, early mobilization should be encouraged in COVID-19 patients. The reviewed studies have shown that different techniques of respiratory therapy such as airway clearance, postural drainage, manual thorax percussion and active cycle of breathing techniques have proved to reduce the following symptoms of COVID-19: dyspnea and anxiety. They also improved the oxygen saturation, respiratory function and respiratory muscular strength. However, there is still not enough sufficient evidence available in this domain that could monitor the long-term effects of respiratory physiotherapy in patients

suffering from COVID-19 and their post COVID-19 lung capacity. More work should be done in order to record its effectiveness and to establish better guidelines for further intervention.

Conclusion

As the whole world is going through the pandemic, medical professionals and researchers are still struggling to come up with effective treatment options for patients suffering from novel coronavirus.

As this virus mostly affects the lungs of patients, more emphasis is being put on improving respiratory health. Physical therapy has shown to achieve improvement in breathing rate, lung compliance, respiratory muscle strengthening and overall functional capacity of patients. However more research is needed.

Conflict of interest statement. None declared.

References

1. Shereen MA, Khan S, Kazmi A, *et al.* COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses. *J Adv Res* 2020; 24: 91-98.
2. Zhu N, Zhang D, Wang W, *et al.* A Novel Coronavirus from Patients with Pneumonia in China. *NEJM* 2019; 382(8): 727-733.
3. Corman VM, Lienau J, Witzentath M. Coronaviruses as the cause of respiratory infections. [Coronaviren als Ursache respiratorischer Infektionen]. *Der Internist* 2019; 60(11): 1136-1145.
4. Wang D, Hu B, Hu C, *et al.* Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. *JAMA* 2020; 323(11): 1061-1069.
5. Chen H, Guo J, Wang C, *et al.* Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet* 2020; 395(10226): 809-815.
6. Spruit MA, Singh SJ, Garvey C, *et al.* An official American Thoracic Society/European Respiratory Society statement: key concepts and advances in pulmonary rehabilitation. *Am J Respir Crit Care Med* 2013; 188(8): e13-64.
7. Wang TJ, Chau B, Lui M, *et al.* Physical Medicine and Rehabilitation and Pulmonary Rehabilitation for COVID-19. *Am J Phys Med* 2020; 99 (9): 769-774.
8. Smondack P, Gravier FE, Prieur G, *et al.* Physiotherapy and COVID-19. From intensive care unit to home care-An overview of international guidelines. [Kinésithérapie et COVID-19: de la réanimation à la réhabilitation à domicile. Synthèse des recommandations internationales]. *Revue des maladies respiratoires*, 2020; 37(10): 811-822.
9. McGuinness LA, Higgins JPT. Risk-of-bias VISualization (robvis): An R package and Shiny web a. app for visualizing risk-of-bias assessments. *Res Synth Methods n/a(n/a)* 2020.
10. Arora M, Jain H, Khare S. Symptomatic Respiratory Physiotherapy Management Strategies for COVID-19 Patients. Symptomatic Respiratory Physiotherapy Management Strategies for COVID-19 Patients (May 15, 2020). Available at SSRN: <https://ssrn.com/abstract=3601818>.
11. Battaglini D, Robba C, Caiffa S, *et al.* Chest physiotherapy: An important adjuvant in critically ill mechanically ventilated patients with COVID-19. *Respir Physiol Neurobiol* 2020; 282: 103529.
12. Kalirathinam D, Guruchandran R, Subramani P. Comprehensive physiotherapy management in COVID-19—a narrative review. *Scientia Medica* 2020; 30(1): e38030-e38030.
13. Kachpile ST, Lohakare P K, Jiandani MP, Salagre SB. Physiotherapy interventions in COVID-19 patient with multiple comorbidities: a case report. *Int J Health Sci Res* 2020; 10(10): 96-101.
14. Liu K, Zhang W, Yang Y, *et al.* Respiratory rehabilitation in elderly patients with COVID-19: A randomized controlled study. *Complement Ther Clin Pract* 2020; 39: 101166.
15. Silva CMS, Andrade AN, Nepomuceno B, *et al.* Evidence-based Physiotherapy and Functionality in Adult and Pediatric patients with COVID-19. *J Hum Growth Dev* 2020; 30(1):148-155.
16. Vitacca M, Carone M, Clini EM, *et al.* Joint Statement on the Role of Respiratory Rehabilitation in the COVID-19 Crisis: The Italian Position Paper. *Respiration* 2020; 99(6): 493-499.
17. Huang C, Wang Y, Li X, *et al.* Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020; 395(10223): 497-506.
18. Hartley P, Costello P, Fenner R, *et al.* Change in skeletal muscle associated with unplanned hospital admissions in adult patients: A systematic review and meta-analysis. *PloS One* 2019; 14(1): e0210186.
19. Schweickert WD, Pohlman MC, Pohlman AS, *et al.* Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial. *Lancet* 2009; 373(9678): 1874-1882.