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Physiotherapy for covid patients: Scoping review

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Abstract
Background: The purpose of this study will be to provide information about the role of physiotherapy in the management of individuals with COVID-19 and to understand the necessity of rehabilitation at all stages to enable functional return to home.
Aim: To review role of physiotherapy in COVID patients.
Methods: This review was carried out by searching in databases including Google scholar, PUBMED, Cochrane. Search was done using the following keyword combination; COVID-19, physical therapy, treatment. The search was conducted over systematic reviews on physiotherapy interventions for COVID-19 patients. Articles included in the study are between April2020- September2020.
Result: Data was summarized on physical therapy treatment using 8 articles.
Conclusion: Physiotherapy treatment for patients suffering from COVID 19 should be according to the stage and severity of the disease. Physiotherapy goals include reduction in symptoms such as dyspnoea, prevention of complications, to relieve anxiety and depression, reduce disability and maximize the ability of daily living and improvement of quality of life.

Keywords: COVID-19, physical therapy, treatment

Introduction

A large family of viruses that include Corona virus is known to cause respiratory distress in humans that vary from the common cold to more rare and serious diseases such as the Severe Acute Respiratory Syndrome (SARS) [1]. Amongst the four genera: alpha-, beta-, gamma- and delta- corona viruses, beta- corona viruses or alpha- corona viruses are known to cause diseases in humans [1]. By January 2020 an emerging zoonotic agent, (SARS-CoV-2), were identified in respiratory samples in patients diagnosed with pneumonia who later developed respiratory failure [2]. Sneezing and coughing can make the virus communicable. Through hand contact on a contaminated area/surface, it can be transferred to another person followed by touching the eyes/nose or mouth. The droplets last on hard surfaces and soft surfaces for at least 24 hours and 8 hours respectively [2]. Individuals affected with COVID-19 may have respiratory tract infection, or may have influenza-like illness presenting fever (89%), fatigue (38%), sputum production (34%), cough (68%) and/or shortness of breath (19%). The severity of the disease can be mild, moderate or severe as it ranges from asymptomatic cases/ asymptomatic infection to viral pneumonia or/death [3]. The CT imaging features shows mild to severe pulmonary changes: ground glass opacity (GGO), consolidation, interlobular septal thickening, bronchial wall thickening, sub pleural line, lymph node enlargement, pleural effusion, and pericardial effusion in accordance with the standard morphologic descriptors based on the Fleischner Society Nomenclature Committee recommendations and similar studies [4]. "Post-acute COVID 19 syndrome" is experience of symptoms related to the disease after the acute phase of infection [5]. Symptoms for "post-acute COVID-19 syndrome" were defined as presence of at least one of the following: dyspnoea (grade 2 according to the MRC scale), weight loss, persisting chest pain, headache, palpitations, ageusia /anosmia, myalgia, asthenia (grade 3 or 4 according to WHO), diarrhea, vomiting or fever [6]. Physiotherapists are recognized as professionals playing a fundamental role in multidisciplinary teams to provide ventilator support during the acute illness and rehabilitation interventions to promote functionality [3]. All health domains i.e. physical, emotional, psychological and social wellbeing together form therapeutic approach. Based on personalized assessment and intervention, it forms a part of multidisciplinary approach which is not limited to only exercise training. Discharge planning and return to work is based on functional capacity, muscle performance, fatigue and cardio respiratory response. The negative impact of COVID 19 on health and functionality can be minimized with the help of physiotherapy [7].

Physiotherapy plays an important role throughout patient hospitalization in individuals who require hospital care and/or in Intensive Care Unit.[8]These healthcare specialists provide conservative care and treatment, changes in posture, exercises, functional mobility and to wean from mechanical ventilator support [9].

High-risk patients may also benefit, for example: patients with existing co morbidities that may be associated with hyper secretion or ineffective cough (for example; neuromuscular disease, respiratory disease and cystic fibrosis) [3].

To promote rapid functional recovery, it is essential to initiate early rehabilitation after the acute phase of respiratory distress to limit the severity of ICU-acquired weakness in order to enable a functional return to home [3].

Material and Methods

The aim was to study and summarize the findings in the articles on physical therapy for COVID-19 patients. This review was carried out by searching in databases including Google scholar, PUBMED, Cochrane. Search was done using the following keyword combination; COVID-19, physical therapy, treatment. An internet search was also conducted to retrieve literature not available through usual databases. The search was conducted over systematic reviews on physiotherapy interventions for COVID-19 patients. Articles included in the study were between April2020- September2020. The inclusion criteria was, 1) Articles including physiotherapy treatment for COVID 19, 2) Full test articles, 3) Systematic reviews, 4) Population including both the genders. The exclusion criteria was as follows: 1) Case reports, 2) Studies which has only abstracts, 3) Duplicate article, 4) Registered protocols

Search Strategy

Articles were selected by searching databases including Google scholar, PUBMED, Cochrane using the keywords COVID 19, physical therapy, treatment between April 2020-September 2020. Considering the inclusion and exclusion criteria, 14 articles were selected for reviewing. 4 articles were excluded as they were only registered protocols, 2 were excluded as they did not meet the inclusion criteria for systematic reviews.

Search outcome

The search resulted in 8 articles after meeting the inclusion and exclusion criteria therefore 8 articles were selected for the review

Data analysis

In this study, AMSTAR 2 Scale has been used. The search resulted in 8 articles; therefore 8 articles were selected for the review.

All the 8 articles that were included for the study were assessed by AMSTAR-2 (A Measurement Tool to Assess Systematic Reviews).

Table 1: Responses of 16 questions (n=8)

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16
Review1	N	Py	N	Py	Y	Y	Py	N	N	Y	Nmc	Nmc	N	N	Nmc	Y
Review2	N	N	N	py	N	N	N	N	N	N	Nmc	Nmc	N	N	Nmc	N
Review3	N	N	Y	py	Y	Y	Y	N	Y	Y	Nmc	Nmc	N	N	Nmc	Y
Review4	N	N	N	PY	Y	N	N	N	N	N	Nmc	Nmc	N	N	Nmc	Y
Reveiw5	N	N	Y	PY	N	N	N	N	N	N	Nmc	Nmc	N	N	Nmc	N
Review6	N	N	N	N	N	N	N	N	N	N	Nmc	Nmc	N	N	Nmc	Y
Review7	N	N	Y	PY	N	N	N	PY	N	N	Nmc	Nmc	N	N	Nmc	Y
Review8	N	N	N	N	Y	Y	N	N	N	Y	Nmc	Nmc	N	N	Nmc	Y

N: No, Y: Yes, PY: Partial Yes, NMC: No Meta-analysis Conducted, Q: Question

Table 2: Percentage of the responses based on AMSTAR 2

N=8	Yes	No	Partial Yes	No Meta-Analysis Conducted
Q1		8 (100%)		
Q2		7 (87.5%)	1 (12.5%)	
Q3	3 (37.5%)	5 (62.5%)		
Q4		2 (25%)	6 (75%)	
Q5	4 (50%)	4 (50%)		
Q6	3 (37.5%)	5 (62.5%)		
Q7	1 (12.5%)	6 (75%)	1 (12.5%)	
Q8		7 (87.5%)	1 (12.5%)	
Q9	1 (12.5%)	7 (87.5%)		
Q 10	3 (37.5%)	5 (62.5%)		
Q 11				8 (100%)
Q 12				8 (100%)
Q 13		8 (100%)		
Q 14		8 (100%)		
Q 15				8 (100%)
Q 16	6 (75%)	2 (25%)		

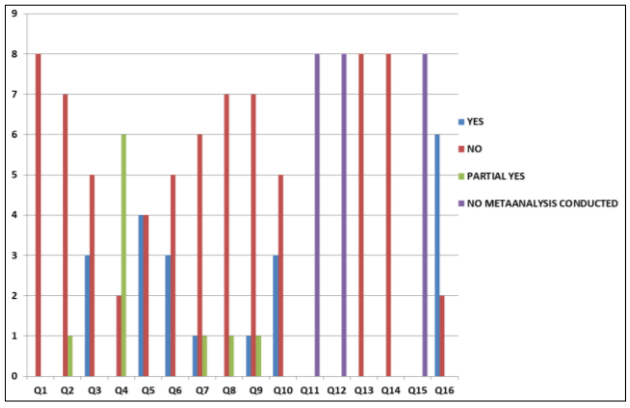

Fig 1

It is observed that 8 (100%) research questions and inclusion criteria for the review have not included the components of PICO. Few have included population or/and intervention or outcome but not all the components. It is seen that 7 (87.5%) report of the review did not contain an explicit statement that the review methods were established prior to the conduct of the review and did not justify any significant deviations from the protocol. 1(12.5%) stated that they had a written protocol including review question, a search strategy, inclusion/exclusion criteria and a risk of bias assessment but did not mention about registration of the protocol, hence a "partial yes". It can be observed that 3(37.5%) review authors have explained their selection of the study designs for inclusion in the review whereas 5 (62.5%) have not given any explanation for including only RCTs or including only NRSI or both the study designs in the review. 6 i.e,75% review authors have used a comprehensive literature search strategy by searching at least 2 databases, by providing key word and/or search strategy and have justified publication restrictions(e.g. language) but have not searched the reference lists/bibliographies of included studies, trails/study registers, included/consulted content experts in the field, searched for grey literature and conducted search within 24 months of completion of the review hence a "partial yes", where as the other 2 (25%) have not searched for any of the mentioned above. It is seen that 4(50%) review authors have performed study selection in duplicate by at least two reviewers independently agreeing on selection of eligible studies and achieved consensus on which studies to include. Other 4 i.e., 50% have not independently agreed on selection of eligible studies and achieved consensus on which studies to include.

It is observed that 3(37.5%) review authors have performed data extraction in duplicate, as at least two reviewers achieved consensus on which data to extract from included studies but 5(62.5%) have not performed data extraction in duplicate. 1(12.5%) review authors have provided a list of excluded studies and have justified the exclusion from the review of each potentially relevant study. 6 (75%) have not provided a list of excluded studies and justified the exclusion where as 1(12.5%) have provided a list of all potentially relevant studies that were read in full-text form but excluded from the review. It is observed that 7(87.5%) review authors have not described the included studies in adequate detail and 1(12.5%) have described populations, interventions, comparators, outcomes; research designs but not in detail hence a "partial yes". It can be seen that 7 i.e,87.5% review authors have not used a satisfactory technique for assessing the risk of bias(Rob) in individual studies and 1 i.e,12.5% have assessed Rob from unconcealed allocation and lack of blinding of patients and assessors when assessing outcomes. Allocation sequence was not truly random and for NRSI, has assessed Rob from selection bias. It is observed that 3 i.e,37.5% review authors have reported on the sources of funding for the studies included in the review or some have looked for this information but it was not reported by study authors hence "yes". Among these, 5(62.5%) have not reported either. 8(100%) review authors have not accounted for Rob in individual studies when interpreting the results of the reviews such as including only low risk of bias RCTs or moderate or high Rob.

Result

Table 3

Author/Year	Aim	Intervention	Conclusion
Kristy Wittmeier, Joanne Parsons *et al* (September 4,2020)	To summarize physical therapy specific operational considerations to help hospital-based leadership teams in planning and response efforts during the COVID-19 pandemic.	Inpatient: management of musculoskeletal concerns and intensive care unit (prone positioning, preventing effects of immobility), transfer techniques, use of walking aids, and bed Mobility. Outpatient: tele-rehabilitation, community-based Rehabilitation.	Physical therapists play an important role in response efforts related to major events affecting health and wellness, including the COVID 19 pandemic, regional planning efforts during the pandemic and in general preparedness planning.
Oliwia A. Jarosz, Beniamin Szmelcer *et al* (2020)	To understand that respiratory rehabilitation is applicable also in COVID-19, being a respiratory disease.	Breathing exercises, postural drainage, coughing techniques (double coughing, reinforced coughing, controlled coughing, intensive exhalation and coughing combined with intensive breathing). Others were patting the chest (chest spring, chest vibration)	Respiratory physiotherapy in COVID 19 does not differ from the basic techniques used in other respiratory diseases and should be based on supporting expectoration of secretions in the lungs and exercises to reduce breathlessness. Lack of physiotherapy will cause complications, therefore every effort should be made to prevent them.
Demeco, N. Marotta *et al* (2020)	To help patients restore physical and respiratory function and to reduce anxiety and depression particularly for patients with co morbidities and those who live alone or in rural settings, to restore a good quality of life.	Aerobic exercises (walking, jogging, swimming) Strength training, balance training, breathing training(breathing techniques),use of PEP and other.,ADL guidance-basic activities of daily living (BADL,IADL)	Physiotherapists will be increasingly involved in the care of these patients, to improve pulmonary function, physical and psychological efficiency, and to restore a good patient quality of life.
Yuetong Zhu, PT, DS1)*, Zimin Wang, PT *et al* (2020)	To clarify the recommended methods of physiotherapy and respiratory rehabilitation for patients in different stages of the COVID-19.	ACUTE STAGE: position change, prone position ventilation, respiratory control, PROM, NMES, bedside standing training, walking exercises etc. STABLE PERIOD: respiratory muscle training, airway clearance, abdominal breathing and diaphragm training and resistance training. RECOVERY PERIOD: aerobic exercises, resistance training, breathing training and ADL training.	They concluded that physiotherapy for COVID-19 patients should be according to the stage of the disease and condition of the patients. It will not only reduce the mortality rate of patients, hospital admission time and medical expenses, but also save medical resources, reduce personal and national economic losses.
Ayman A Mohamed*, Motaz Alawna *et al* (2020)	To demonstrate the short and long term effects of increasing the aerobic capacity on increasing the function and strength of immune and respiratory systems to overcome COVID-19 infections and associated disorders.	Aerobic exercises	Increasing the aerobic capacity can improve immune and respiratory functions and can decrease the morbidity and mortality roles of COVID-19 to allow better body functions against COVID-19.
Auwal Abdullahi (21 july,2020)	To critically review the nature of respiratory problems and the safety and efficacy of the use of chest physiotherapy in patients with COVID-19	ACUTE STAGE: use of mechanical ventilator. For exudation and mild to moderate symptoms: chest physiotherapy. MECHANICAL VENTILATION: lung maneuver recruitment, ET suctioning .Airway clearance techniques: positioning, manual hyperinflation, percussion and	Chest physiotherapy may improve respiratory functions and quality of life in patients with COVID-19 and depends on the severity of the disease. Therefore, when patients present with symptoms that can benefit from chest physiotherapy, it may be given under observation for any

		vibration, ACBT, PEP, and mechanical insuflation-ensufflation. POST-EXTUBATION: respiratory muscle training, cough exercise, diaphragmatic training, stretching exercise.	adverse events.
JC winca *et al*(2020)	To describe some problems with the management of COVID-19 induced acute respiratory failure by pulmonologists	Non-Invasive Ventilation and High Flow Nasal Cannula, prone positioning, combination of both NIV and HFNC and high flow nasal cannula.	Non-invasive respiratory therapies can be beneficial in reducing the risks to healthcare workers by obviating the need for intubation which is a potentially highly infectious procedure.
Denise Battaglini a,b *et al*(2020)	To discuss the important role of chest physiotherapy in critically ill Mechanically ventilated patients with COVID-19, with careful organization, including the training of healthcare staff and the use of personal protective equipment to minimize the risk of exposure.	Ventilator management, prone positioning, chest physiotherapy for mechanically ventilated COVID-19 patients and during mechanical ventilation, alveolar recruitment, drainage for subglottic secretions, postural drainage, ventilator hyperinflation, pre extubation chest physiotherapy, ACBT, manual hyperinflation, NIV, CPAP, HFNO	Several physiotherapy techniques can be safely applied in the patients to reduce atelectasis and improve outcomes. All physiotherapy interventions should be carefully organized, and personnel must always wear appropriate personal protective equipment to minimize exposure.

Discussion

This scoping review aimed to provide an overview of physiotherapy in patients affected by COVID 19. The findings of this scoping review have been drawn from 8 articles, each of which included physiotherapy treatment for COVID 19. Patients with co morbidities causing significant functional decline and/or at risk for ICU- acquired weakness or if any other similar clinical indications are identified, only then physical therapy assessment and treatment should be provided [10]. Yuetong Zhu, PT *et al* and Auwal Abdullahi suggested that physiotherapy treatment for patients suffering from COVID 19 should be according to the stage and severity of the disease. They explained physiotherapy for these patients in three stages [11, 12]. Yuetong Zhu, PT *et al* described treatment in ACUTE STAGE: 1) Position change: Possibilities of bedsore can be decreased by positioning, reduce dyspnoea and promote excretion of sputum, hence 45 to 60 degrees (half-sitting) or seated postures are promoted whenever possible and could be performed 3 times/day for at least 20 min/time. 2) Prone position ventilation. (3) Respiratory control: can be performed in sitting. Patient is instructed to take prolonged breaths while the individual relaxes his/her accessory muscles of inspiration which can be followed by pursed lip breathing during expiration. Other interventions include passive joint motion, neuromuscular electrical stimulation, bedside exercises, and walking exercises. STABLE/ISOLATION STAGE: 1) Airway clearance techniques: postural drainage, active cycle of breathing technique, assisted coughing and huffing. 2) Exercise therapy: mild exercise training, twice a day for 30 minutes. 3) Abdominal breathing and diaphragm training. 4) Respiratory muscle training: depending on the respiratory function of the patients, moderate respiratory strength training can be given. 5) Resistance strength training: progressive resistance training (3 muscles groups per day with 10 repetitions, 1 repetition maximum= 50-70%). 6) Psychological therapy 7) Balance training: sitting and standing. RECOVERY PERIOD: 1) Balance training 2) Airway clearance techniques 3) Breathing exercises: pursed lip breathing, thoracic expansion exercises, abdominal breathing. 4) Aerobic exercises: exercises such as walking, swimming, dancing can be encouraged starting with low intensity. Intensity can be increased every week by 10%. It should be performed 30-60 minutes per day frequency being at least 5 times per week for at least 6 weeks. 5) Resistance training: progressive resistance exercises for at least 6 weeks, 2-3 times a day (8-12 repetition maximum). 6) Activities of daily living training: hygiene maintenance, transfer, bathing, toilet can be encouraged in this phase [11]. Auwal Abdullahi explained the treatment under acute, mechanical ventilation and post extubation stage. As patient has no exudation, chest physiotherapy may not be recommended during the acute stage. In patients having severe symptoms, use of mechanical ventilator is the priority. To relieve dyspnoea, depression or anxiety, chest physiotherapy can be used in patients having mild to moderate symptoms, or for those with extubation and varies on severity of the disease. Chest physiotherapy can also be considered in the second stage where patients may lose spontaneous breathing, developing lung collapse and ventilator associated pneumonia. Many patients can develop respiratory failure post extubation hence using chest physiotherapy it can be prevented. Following discharge, respiratory muscle training, cough exercises, stretching exercises, diaphragmatic training and home exercises can be considered [12]. Demeco *et al* and Ayman A Mohamed in their study mentioned about aerobic exercises and its importance. They suggested low intensity aerobic exercises for COVID patients at least 5 times per week for 20-30 minutes that include swimming, jogging, brisk walking gradually increasing the duration and intensity every week. [13, 14] According to Demeco *et al*, respiratory rehabilitation is not advised for severe and critical patients but is applicable for individuals who have recovered. For patients with co morbidities, obesity, advance age and persistent complications, respiratory rehabilitation interventions should be personalized. Patients with balance dysfunction should undergo balance training using a device including hands free training under the guidance of a physiotherapist. Progressive resistance training 2 to 3 times a week for 6 weeks can be given as a part of strength training with increase in 5-10% every week. If patients have symptoms like shortness of breath, difficulty in excretion of sputum, wheezing breathing training can be given. Use of positive expiratory pressure (PEP)/oscillatory PEP and other equipments are useful. Basic activities of daily living assess the patient's ability to carry out activities of daily living such as grooming, bathing and other and provide rehabilitation guidelines [13]. Ayman A Mohamed

summarizes that by increasing aerobic capacity, there will be an improvement in immune and respiratory functions that could help counter COVID-19. [14] The ERS/ATS clinical practice guidelines recommend NIV as a preventive strategy for avoiding intubation in hypoxemic. In patients with moderate to severe ARDS, need of intubation can be avoided with early prone positioning added to HFNC or NIV. In mild cases, HFNC alone or with prone positioning could be effective. In case of moderate ARDS, NIV alone or with prone positioning may work [15]. For short periods after extubation, until complete autonomy is reached, HFNC, NIV and CPAP should be considered. Since there is an improvement in patients who underwent respiratory physiotherapy (chest physiotherapy) before and after extubation, it can be considered in those who might be eligible for spontaneous breathing [16]. Oliwia A. Jarosz *et al* concluded that respiratory physiotherapy in COVID 19 does not differ from the basic techniques used in other respiratory diseases and should be based on supporting expectoration of secretions in the lungs and exercises to reduce breathlessness [17]. Holistic management of patient with emphasis on reassurance, patient education, prevention of circulatory and respiratory complications that include use of thrombo embolic deterrent (TED stocking) for DVT prevention [18]. Physical therapists also play an important role in responding to pandemic and physical disaster situations. As suggested by authors physiotherapists have a role in triage, screening, early discharge from hospital and supporting other staff. In disaster situations and pandemic, they play an important role in preparedness planning and also in outpatient and inpatient setting. Using telerehabilitation, it was recognized that this may be delivered in community setting or in Patients homes. Inpatient roles for physical therapists were the emergency department (management of musculoskeletal concerns) and intensive care unit [19].

Conclusion

Physiotherapy treatment for patients suffering from COVID 19 should be according to the stage and severity of the disease. Physiotherapy goals include reduction in symptoms such as dyspnoea, prevention of complications, to relieve anxiety and depression, reduce disability and maximize the ability of daily living and improvement of quality of life. Respiratory rehabilitation interventions include ACBT, chest expansion exercises, ATMs, prone positioning, breathing exercises, chest physiotherapy, NIV, HFNC etc. Physical functional training includes aerobic exercises. Strength training can be carried out with the use of dumbbells, therabands for progressive resistance training. Others include psychological rehab and designing activities of daily living with the purpose of return to work and encourage social participation.

Limitations

Limitation of this review is inclusion of only systematic reviews.

Recommendation

Physiotherapists play an important role in provision of musculoskeletal/ neurological/ cardiopulmonary tasks. Physiotherapy should be given to those who have functional limitations (advanced age, multiple co morbidities, Acquired weakness) and physiotherapists should look for any contraindications. Physiotherapy treatment for patients suffering from COVID 19 should be according to the stage and severity of the disease. Holistic management for patient should be provided with emphasis on patient education. Early mobilization is encouraged. To improve joint integrity and range of motion, active, passive, active assisted exercises are recommended. Assessment of respiratory function can be done by using dyspnoea index scale or Borg sale. Aerobic capacity and endurance can be assessed by 6 minute walk test. Mobilization and rehabilitation that include (prone positioning, bed mobility, sitting and standing balance, exercise programs) is recommended. Activities of daily living should be encouraged. For airway clearance, interventions that include ACBT, abdominal breathing training, chest expansion exercises, postural drainage, chest physiotherapy is effective. Breathing techniques can be carried out with the help of PEP and other devices. Low intensity aerobic exercises for COVID patients at least 5 times per week for 20-30 minutes that include swimming, jogging, brisk walking gradually increasing the duration and intensity every week is advised. Progressive resistance training 2 to 3 times a week for 6 weeks can be given as a part of strength training with increase in 5-10% every week. Respiratory muscle training should be given to improve the function of respiratory muscles [18].

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Conflict of Interest

No conflict of interest

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