

Clinical Importance of Physiotherapy Intervention in Adults with Moderate Symptoms Managed at a Dedicated COVID Government Tertiary Care Hospital - A Case Report

Dolly Dinesh Kanakia¹, Nidhi Pradeep Savla¹, Rutuja Ashok Bute¹,
Anagha Nitin Mangaonkar¹, Chhaya Vijaykumar Verma¹

Physiotherapy School and Centre, Topiwala National Medical College and
B.Y.L. Nair Charitable Hospital, Mumbai, Maharashtra, India.

INTRODUCTION

Coronavirus disease (Covid-19) is caused by infection from the novel SARS CoV-2. The higher potential of this virus to spread has caused a worldwide pandemic situation and a serious public health crisis¹. This case report aims to highlight the responses and benefits attained from physiotherapy management in COVID 19 patients at a dedicated tertiary care hospital with distinct characteristics and age group.

Today, India is in the midst of the coronavirus pandemic wherein all its healthcare workers are relentlessly fighting against the unseen enemy. SARS CoV-2 which was identified in the Wuhan city of China in December 2019 primarily affects the respiratory system causing abnormal pulmonary mechanics due to ventilation perfusion mismatch and / or intrapulmonary shunting. This case series is an attempt to discuss various physiotherapeutic interventions administered to patients admitted in the wards of a government tertiary care hospital dedicated for Covid-19 management and its benefits in enhancing recovery and function.

A written informed consent along with due consent of the patient for his pictorial representation was obtained.

This series describes the cases of four patients with varied characteristics and age who presented with complains of fever, dry cough and breathlessness in our COVID dedicated tertiary care hospital. After ensuring stability in the overall health condition of the patients, physiotherapy intervention was planned for these patients with emphasis on patient education and positioning strategies. All the four patients presented with symptoms of fever, dry cough and breathlessness in common leading to a clinical diagnosis of lower respiratory tract infection (LRTI). Case 2 also complained of fatigue and weakness. On observation, the patients had increased work of breathing with abnormal breathing pattern which led to breathlessness. Patients showed decreased oxygen saturation when measured with pulse oximeter indicative of ventilation-perfusion mismatch.

Corresponding Author:

*Dr. Nidhi Pradeep Savla,
Physiotherapy School & Centre,
Topiwala National Medical College
& BYL Nair Charitable Hospital,
Mumbai - 400008, Maharashtra, India.
E-mail: nidsav13@gmail.com*

DOI: 10.18410/jebmh/2021/22

How to Cite This Article:

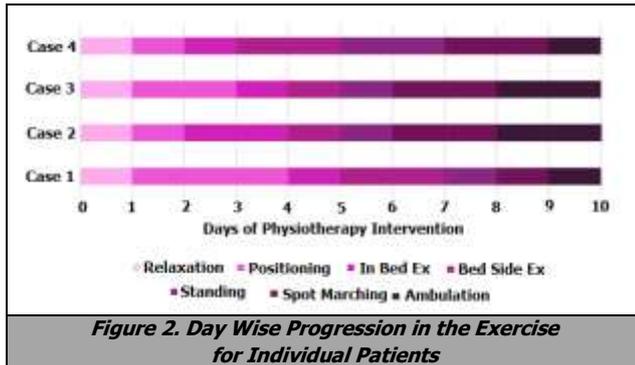
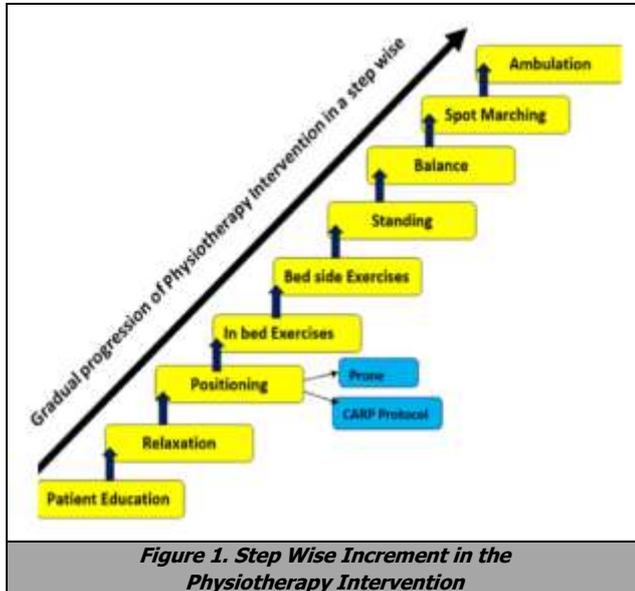
*Kanakia DD, Savla NP, Bute RA, et al.
Clinical importance of physiotherapy
intervention in adults with moderate
symptoms managed at a dedicated
COVID government tertiary care hospital
- a case report. J Evid Based Med Healthc
2021;8(02):115-119. DOI:
10.18410/jebmh/2021/22*

*Submission 27-09-2020,
Peer Review 06-10-2020,
Acceptance 25-11-2020,
Published 11-01-2021.*

*Copyright © 2021 Dolly Dinesh Kanakia
et al. This is an open access article
distributed under Creative Commons
Attribution License [Attribution 4.0
International (CC BY 4.0)]*

	Case 1	Case 2	Case 3	Case 4
Age / Gender	29 / male	39 / male	60 / male	61 / male
Comorbidities	None	None	Hypertension	Diabetes mellitus Hypertension
History of Travel or Contact	None	None	None	None
Medical Management	Symptomatic treatment; Oxygen supply using Non-Rebreather Bag and Mask ventilation at 10L / min O ₂	Symptomatic treatment; Oxygen supply using Non-Rebreather Bag and Mask ventilation at 10L / min O ₂	Symptomatic treatment; Oxygen supply using Non-Rebreather Bag and Mask ventilation at 15L / min O ₂	Symptomatic treatment; Oxygen supply using Non-Rebreather Bag and Mask ventilation at 15L / min O ₂
HRCT Thorax	Multifocal large confluent areas of consolidation, ground glass opacities in B / L lung parenchyma. Predominantly B / L upper and right middle lobe-typical of COVID 19 pneumonia with 60 % lung involvement	Multifocal, confluent areas of consolidation with surrounding ground glass opacities. Predominantly B / L lower lobes. Severity score is 4 (i.e., 80 % involvement indicative of severe disease)	Patchy and confluent areas of GGOs with forming dense consolidation are seen in bilateral lung fields involving all segments. Predominantly in posterior and basal segment.	Multiple, ill-defined areas of ground glass attenuation with interspersed patches of consolidation scattered in all segment of B / L lung parenchyma typical for COVID 19 pneumonia with 90 % lung Involvement

Table 1. Characteristics and Presentation of the Cases



On further investigations, all these patients were admitted at acute care set up with a medical diagnosis of COVID 19 which was tested on reverse transcriptase-polymerase chain reaction (RT-PCR) and also on the basis of high-resolution computed tomography (HRCT).

Case 1

LRTI with acute respiratory distress syndrome (ARDS).

Case 2

LRTI with COVID 19 pneumonia.

Case 3

LRTI with COVID 19 with moderate ARDS with type 1 respiratory failure.

Case 4

LRTI with COVID 19 pneumonia with type 1 respiratory failure.



Figure 3 A. Prone Positioning

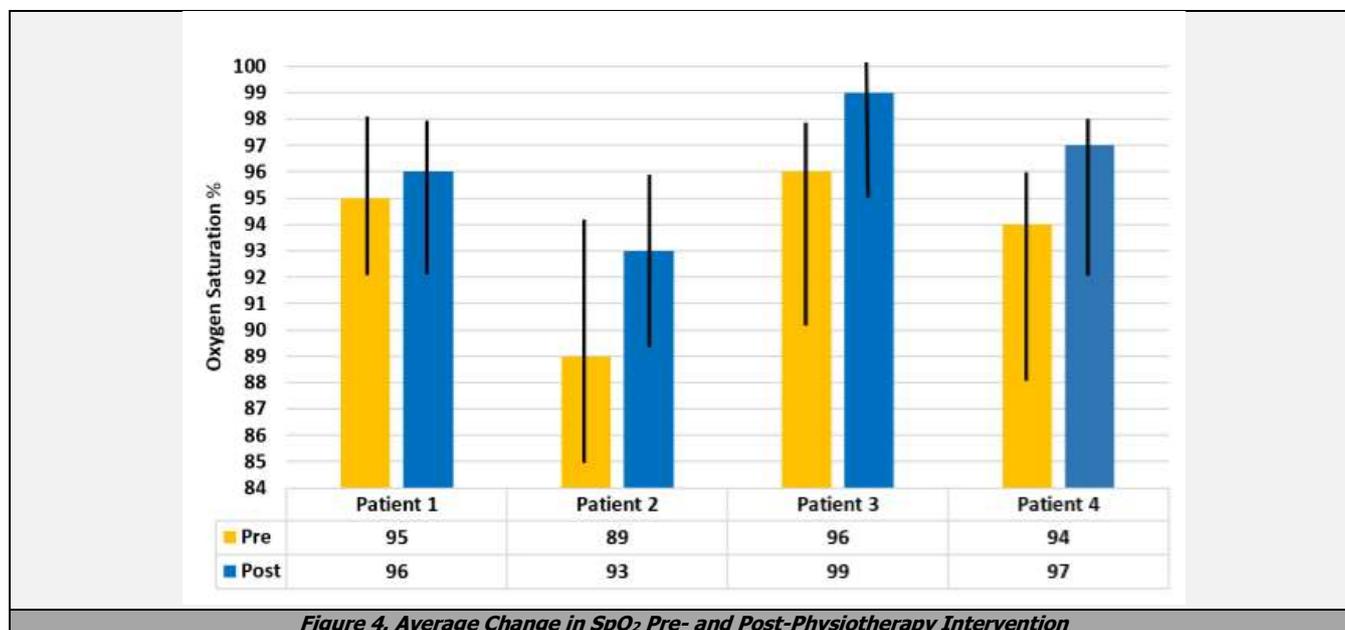


Figure 3 B. Thoracic Expansion Exercise



Figure 3 c. Spot Marching

Figure 3. Physiotherapy Intervention Which Includes Prone Positioning Thoracic Expansion Exercise and Spot Marching



DISCUSSION

SARS-CoV-2 primarily affects the respiratory system wherein it predominantly causes arterial hypoxemia with abnormal pulmonary mechanics causing LRTI. The respiratory symptoms are seen owing to the affinity of coronavirus with the target cells through angiotensin converting enzyme which has been proved to be a functional receptor for SARS CoV. Ventilation / perfusion mismatch and / or intrapulmonary shunting has been observed in these patients due to downregulation of angiotensin-48 converting enzyme 2 (ACE2) secondary to viral endocytosis playing a key role.² Injured lung parenchyma with ground-glass opacities or consolidation show ventilation perfusion mismatch secondary to hypoxic pulmonary vasoconstriction. It is hypothesized that due to decreased availability of ACE 2 receptors, there is accumulation of angiotensin II which is a potent vasoconstrictor. These changes affect the vascular resistance leading to the development of the shunt towards areas of non-aerated hyperperfused lungs.³ Poorer outcomes are seen in patients with comorbidities like diabetes mellitus and hypertension, hypothesizing coronaviruses binding to their target cells through ACE2. These are expressed by epithelial cells in the lungs, intestines, kidneys, and blood vessels. The combination of dysregulated immune function, increased T-cell activation, elevated inflammatory cytokines and alveolar dysfunction may cause increased severity of COVID 19 in such patients.⁴

COVID 19 pandemic is a public health crisis of our time and one of the greatest challenges faced by the 188 countries including India posing an unprecedented socio-economic crisis. Additionally, it has set in immense pressure on the health care fraternity to combat the pandemic efficiently.

Apart from physical sufferings, disease-associated stigmatisation and factors like fear of isolation and quarantine have led to unavoidable stress, emotional set back, fear and anxiety about a poorly known contagious disease outbreak. This behaviour, has in turn, affected the

mental health and well-being thereby making it necessary to address these aspects of fear, anxiety and apprehension in the management of these patients. Patient education was of utmost importance during the initial phase of the pandemic taking into consideration the uncertainty in the management and the need of controlling the panic state.

This case series highlights our experience during the nationwide COVID19 pandemic lockdown in India with limited concrete evidence and directive to the safety of physiotherapeutic intervention amidst the pandemic.

The four patients in our case report belonged to varied age groups wherein two of our patients had comorbidities of diabetes mellitus and hypertension. The presence of comorbidities slows down the natural healing processes in the body. The activity of natural killer cells the lymphocytes are reduced in individuals with diabetes. Furthermore, there is aggravation of beta cell injury on entry of the virus into pancreatic cells and the downregulation of ACE2 after viral entry may impede insulin secretion.⁵ This series of events leads to impaired blood glucose levels which can delay recovery and cause complications. The aim of physiotherapy management is to enhance early recovery and restore function eventually improving quality of life.

After referral to physiotherapy, patients were recommended pulmonary rehabilitation in conjunction with pharmacological management along with emphasis on patient education addressing apprehension and fearfulness, which are associated with the risk of increasing breathlessness.

Physiotherapy management was initiated in a controlled manner taking into consideration the complaints of the patient. It was carried out under complete supervision with continuous monitoring of oxygen saturation and heart rate using a pulse oximeter.⁶ Exercises were progressed slowly in an incremental fashion starting with patient education, relaxation and controlled breathing as shown in Fig 1. This helped the patients relieve anxiety, increasing their compliance to exercise. Adequate rest pauses during the physiotherapy session were given on the basis of patient's

perception of exertion. The progression of exercise was tailored for individual patients as shown in Fig. 2.

Patients were educated about the characteristics and course of COVID 19 with a view of giving clarity regarding the disease and its recovery rate. Importance of physiotherapy intervention was explained to them with emphasis on its benefits to facilitate early recovery. Experiences of the patients who recovered from the disease were shared in order to motivate the patient and instil positive thinking. This in turn aided in making the patient more compliant to the treatment.

Positioning is a simple low-resource intervention which has been proved to be beneficial in management of patients with COVID 19. Our patients were advised prone positioning for 30 minutes with a frequency of 4 - 5 times in a day as shown in Fig 3 (A), considering their chest CT findings which revealed predominant involvement of bilateral lower posterior basal lobes. Patients were also instructed to attain quarter prone position, side-lying on both sides and propped up sitting position in conjunction with relaxed controlled breathing and lateral stretches in order to enhance aeration in all parts of the lungs. Prone positioning was advised to the patients with a view of counteracting the pleural pressure which is lowest in the ventral lung causing a risk of overdistension and highest in the dorsal lung leading to alveolar decruitment. Evidence suggests that prone positioning helps in increasing the transpulmonary pressure which benefits by alveolar recruitment in the dorsal lung, ultimately leading to better ventilation perfusion matching.⁷ Relaxed controlled breathing assisted in reducing breathlessness and respiratory rate as per evidence suggesting its active role in improving oxygen uptake and pulmonary gas exchange. Thoracic expansion exercises, a technique combining deep breathing with active movements of the trunk and upper limbs as shown in Fig 3 (B) along with lateral stretches were incorporated to enhance functional capacity.⁸ These exercises have shown to improve the collateral ventilation, mobility of the intercostal space, relaxation of the pectoralis major and intercostal muscles, thereby reducing the patient's work of breathing.⁸

Once patients were able to maintain vital parameters in bed side sitting, they were progressed to spot marching exercise in standing as shown in Fig 3 (C), followed by ambulation. The upright positions inclusive of standing and walking helps with optimisation of oxygen transport with a uniformity in the ventilation perfusion matching without any additional exercise stimulus. It is observed that functional residual capacity is more in standing which reduces airway closure and maximises arterial oxygenation.⁹ A drop in the oxygen saturation by 3 % was an indication to terminate therapy and the patient was encouraged to achieve a comfortable position till the recovery of oxygen saturation. With gradual progression of exercises, our patients were able to maintain the oxygen saturation with a change in position and increased activity levels.

Irrespective of varied patient characteristics, positive treatment outcomes were obtained with physiotherapy interventions in all the four patients as shown in Fig 4 with average increase in oxygen saturation (SpO₂). In our experience, progression of exercises was achieved faster in

younger patients as compared to older patients, in view of the relationship between age and closing capacity as a function.⁹ With ageing, the closing capacity increases in the dependent airways further accentuating with recumbent positions. Two of the patients (patient 3 and patient 4) with comorbidities progressed in a similar pattern as that of young patients with no comorbidities.

Taking into consideration the overall health status of the patients, discharge was planned as per the hospital guidelines. A home exercise programme was recommended with the consultation of the treating physician. A regular follow up is maintained under guided supervision and monitoring through telecommunication.

CONCLUSIONS

In our experience, physiotherapy intervention with an emphasis on patient education and positioning proved to be beneficial with these four patients presenting with different characteristics. In our experience, positive effect was observed on level of oxygen saturation and in performance of activities of daily living. Physiotherapy intervention as a part of a holistic approach in the management of COVID 19 patients was beneficial in facilitating recovery and restoring function of the patients.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.

All authors have contributed equally in this study. The authors acknowledge Dr. Mohan Joshi (Dean T.N.M.C. & B.Y.L Nair Hospital) for encouraging us to carry out this study, our patients who co-operated and gave us the consent to use the information, Dr. Rosemarie D'Souza (Professor, Department of Internal Medicine), Dr. Seema Kini (Associate Professor, Department of Internal Medicine), Dr. Mala Kaneria (Associate Professor, Department of Internal Medicine) for Physiotherapy referral of the patients and their kind guidance. All postgraduate students, faculty and staff members of Physiotherapy School and Centre, T.N.M.C. & B.Y.L. Nair Hospital.

REFERENCES

- [1] Cascella M, Rajnik M, Cuomo A, et al. Features, evaluation and treatment of coronavirus (COVID-19). In: StatPearls Treasure Island (FL): StatPearls Publishing Jan 2020.
- [2] Tobin MJ. Basing respiratory management of COVID-19 on physiological principles. *Am J Respir Crit Care Med* 2020;201(11):1319-1320.
- [3] Santamarina MG, Boisier D, Contreras R, et al. COVID-19: a hypothesis regarding the ventilation-perfusion mismatch. *Crit Care* 2020;24(1):395.
- [4] <https://www.touchendocrinology.com/insight/does-diabetes-and-hypertension-impact-riskfor-covid-19-infection-or-outcomes> [Last accessed on 26-09-2020]
- [5] Kohli KK. Covid 19 infection led to ketoacidosis in diabetes patient: case report. Published on May 14th 2020.

- [6] <https://medicaldialogues.in/diabetes-endocrinology/cases/covid-19-infection-led-toketoacidosis-in-diabetes-patient-case-report-65699>
[Last accessed on 26-09-2020]
- [7] Verma CV, Arora RD, Shetye JV, et al. Guidelines of physiotherapy management in acute care of COVID-19 at dedicated COVID center in Mumbai. *Physiotherapy-The Journal of Indian Association of Physiotherapists* 2020;14(1):55-60.
- [8] Scholten EL, Beitler JR, Prisk GK, et al. Treatment of ARDS with prone positioning. *Chest* 2017;151(1):215-224.
- [9] Hristara-Papadopoulou A, Tsanakas J. Results of active cycle of breathing techniques and conventional physiotherapy in mucociliary clearance in children with cystic fibrosis. *Hippokratia* 2007;11(4):202-204.