

Physical functioning in COVID-19 patients at pre-discharge: A case series

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Abstract

COVID-19 disease also known as SARS-COV-2 has made significant impact in India through millions of positive patients in this pandemic. One of the detriments of this disease is reduction in physical function and pulmonary function in turn affecting quality of life of COVID-19 patients. In this case series, 6 COVID-19 patients admitted in COVID-19 specific wards were assessed for physical functioning at pre-discharge phase, to form a baseline parameters to plan home programme and further physiotherapy rehabilitation post discharge.

Keywords: COVID-19; Physiotherapy; Physical functioning; Pre-discharge

1. Introduction

Coronavirus disease i.e. COVID-19 virus infection has caused a sudden major significant increase in hospital admissions [1]. The spread of disease is rapidly worldwide, and on March 11, 2020, was characterized as a pandemic by the World Health Organization [2]. It is highly infectious, and caused by the novel severe acute respiratory syndrome coronavirus 2 which is also known as SARS-CoV-2. As of Dec 15, 2020, SARS-CoV-2 has affected more than 200 countries, and in India more than 9.92 million identified cases with 9.4 million recovered and 9,44,229 confirm deaths [3]. This infection of SARS-CoV-2 may be asymptomatic or it may cause a wide spectrum of symptoms.

These symptoms diversify from mild symptoms such as upper respiratory tract infection to severe such as life threatening sepsis [1]. The common symptoms of COVID-19 are fever, cough and breathlessness. Other symptoms include fatigue, myalgia, and dyspnea [4]. Happy hypoxemia is also most commonly seen, which is decrease in oxygen saturation while performing activities of daily living without dyspnea. Decrease in oxygen saturation eventually affects aerobic capacity of COVID-19 patients to perform work and participate in society, by altering body's oxygen uptake or delivery. Treatment recommendations addresses hospitalization of patients when they are critically ill [5]. The less understanding of pathology of COVID-19 and pathogenesis of this disease with isolation of patients during their hospital stay leads to higher risk of physical de-conditioning, which has an effect on their activities of daily living. Hence physiotherapy is necessary.

Thus physiotherapy management for patients hospitalized with COVID-19 has a goal of improving physical function and survival with reducing associated morbidity [6]. Treatment interventions for elements of respiratory support involve breathing exercises, prone positioning, thoracic expansion exercises and active mobilization [5,7]. While giving active

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mobilization focus is on maintaining and improving oxygen saturation levels during all activities for improving physical function.

Physical function is the ability to perform both basic and instrumental activities of daily living. The ability to perform a motor task, involves the complex integration of the neuro-motor, musculoskeletal, and the cardio-respiratory systems. In COVID-19 the function of one or more of these systems is altered, and this is clinically manifested by alterations in physical function. Physical functioning and ADLs are, in turn, important for participation in-social, vocational, and recreational activities. If an individual is unable to meet the physical-demands then quality of life [QOL] will be diminished [8, 9, 10]. Therefore physical therapy rehabilitation post discharge plays an important key.

Based on earlier experiences and knowledge from the SARS epidemic (SARS-CoV), substantial increase can be expected in long-term physiotherapy rehabilitation need for patients with COVID-19. There is lack of understanding and extensive knowledge about the long-term physical consequences and manifestations of COVID-19 infection, as many post COVID-19 complications are seen altering functional ability [11]. There is clear need of guidance required from physiotherapist's perspective regarding post COVID-19 rehabilitation. No data exists on physical functioning and performance of ADLs at discharge in Indian population.

Our hospital Seth GS Medical and Research Institute and KEM Hospital, is a major tertiary care hospital in India. COVID-19 patients from all over Maharashtra are referred and managed in this hospital. This case series focuses on various clinical presentation and assessment of physical functioning at pre-discharge of patients with COVID-19. Assessment of their functional capacity and lung function is done through 6 min walk test [6MWT], 1 min Sit to stand [STS], Single leg stance and Breath holding time, to form a baseline criteria for planning physiotherapy interventions for improvement in physical function.

2. Patient Information

2.1. Case 1

A 74-year-old male, retired office clerk by occupation, was admitted with positive RTPCR test on 31/08/2020 in COVID-19 specific ICU and presented with chief complaint of fever, cough, and breathlessness since 1 day before admission and presented with HR - 88 beats/min and SpO₂ - 95%.

- Patient had comorbidities: Hypertension (HTN) and Diabetes Mellitus (DM).
- Patient underwent conservative medical treatment comprising:

Vit C, Vit D, Metered dose inhaler, Tab Metformin, Tab Calcium citrate, Tab Folic acid 50, Remdesivir 200, Hb 100, Inj piptaz, Inj Methylprednisolone, Inj Heparin 40.

2.1.1. *Physiotherapy treatment which included:*

- Positioning
- Breathing exercises.
- Early mobilization: in bed mobility comprising heel slides, bridging and bed side mobilisation of UL and LL is done in initial phase, eventually walking is monitored.

On 18/09/2020 i.e. 19th day of hospital admission he was planned for discharged with vital parameters of HR- 112 beats/min and oxygen saturation as SpO₂- 90%. No oxygen support was required at the time of discharge.

2.1.2. *Physical functional assessment as followed:*

A] 6 min walk test:

- Six minute walk distance = 150 m, indicating 34.82 % of predicted distance, No rest pause was taken.
- Rated dyspnea on Modified Borg scale as grade 3.
- Heart rate increased to 114 beats/min and SpO₂ dropped to 89% post test.

B] 1 min sit to stand test:

- Repetitions performed: 15
- One rest pause was taken.

- Rated dyspnea on Modified Borg scale as 1.
- Heart rate was decreased to 104 beats/min and SpO2 dropped to 89% post test.

C] Single leg stance time: 5 sec for both right and left lower extremity, which was markedly reduced.

D] Breath holding time: 7 sec only.

2.2. Case 2

A 57-year-old male, manual worker by occupation, was admitted with positive RTPCR test on 07/09/2020 in COVID-19 specific ICU and presented with chief complaint of fever since 4 days before admission and presented with HR – 110 beats/min and SpO2-94 %.

- Patient had comorbidities: HTN and is k/c/o ischaemic heart disease (IHD)
- Patient underwent conservative medical treatment comprising:

Emset, Asprin, Clopitab, Artrodar, Zinc, Vit. C, Vit. D, Ceftriaxone, Tab Azithromycin, Inj Methylprednisolone, Inj Heparin 40, Remdesivir 200, Hb100, Amlo, Metformin.

2.2.1. Physiotherapy treatment which included:

- Positioning
- Breathing exercises
- Early mobilization: initially when patient was on 2L Nasal prongs, in bed mobility, bed side supported sitting and walking around bed was monitored. When no oxygen support was required marching and monitored walking was performed.

On 18/09/2020 i.e. 15th day of hospital admission he was planned for discharged with vital parameters of HR- 88 beats/min and oxygen saturation as SpO2- 99%. No oxygen support was required at the time of discharge.

2.2.2. Physical functional assessment as followed:

A] 6 min walk test:

- Six minute walk distance =280m, indicating 50.79% of predicted distance, No rest pause was taken.
- Rated dyspnea on Modified Borg scale as grade 2.
- Heart rate increased to 90 beats/min and SpO2 dropped to 96% post test.

B] 1 min sit to stand test:

- Repetitions performed: 20
- No rest pause was taken.
- Rated dyspnea on Modified Borg scale as 1.
- Heart rate was increased to 106 beats/min and SpO2 dropped to 94% post test.

C] Single leg stance time: 2 sec and 5 sec for right and left lower extremity respectively, which was markedly reduced.

D] Breath holding time: 12 sec only.

2.3. Case 3

A 52-year-old male, field work officer by occupation, was admitted with positive RTPCR test on 09/09/2020 in COVID-19 specific ICU and presented with chief complaint of breathlessness, cough and cold since 3 days before admission and presented with HR-110 beats/min and SpO2-82 %.

- Patient had no comorbidities
- Patient underwent conservative medical treatment comprising:

Inj Piptaz, Methylprednisolone, Heparin, Hydroxychloroquine, Oseltamivir, Remdesivir, Zinc, Tab.Vit C, Tab.Vit D and A, MDI Fovacart.

2.3.1. Physiotherapy treatment which included:

- Positioning
- Breathing exercises.
- Early mobilization: heel slides, active mobilisation of upper extremity, bed side sitting with LL mobilisation, standing and marching, walking around bed monitored.

On 22/09/2020 I.e. 13th day of hospital admission he was planned for discharged with vital parameters of HR- 145 beats/min and oxygen saturation as SpO2- 89%. No oxygen support was required at the time of discharge.

2.3.2. Physical functional assessment as followed:

A] 6 min walk test:

- Six minute walk distance = 180m, indicating 27.64 % of predicted distance, one rest pause was taken.
- Rated dyspnea on Modified Borg scale as grade 2.
- Heart rate decreased to 84 beats/min and SPO2 decreased to 85% post test.

B] 1 min sit to stand test:

- Repetitions performed: 13
- No rest pause was taken.
- Rated dyspnea on Modified Borg scale as 2.
- Heart rate was increased to 157 beats/min and SPO2 dropped to 83 % post test.

C] Single leg stance time: 7 sec and 3 sec for right and left lower extremity respectively, which was markedly reduced.

D] Breath holding time: 28 sec only.

2.4. Case 4

A 53-year-old male, clerk by occupation, was admitted with positive RTPCR test on 28/08/2020 in COVID-19 specific ICU and presented with chief complaint of cough and fever since 2 days before admission and presented with HR-114 beats/min and SpO2 92 %.

- Patient had comorbidities: HTN and DM
- Patient underwent conservative medical treatment comprising:

Vit C, Zinc, Vit D and A, Tab. Amlo, Pan 40, Prednisolone, Metformin, Remdesivir.

2.4.1. Physiotherapy treatment which included:

- Positioning
- Breathing exercises.
- Early mobilization: in bed mobility comprising heel slides, bridging and bed side mobilisation of UL and LL is done in initial phase, eventually walking is monitored.

On 18/09/2020 I.e. 23rd day of hospital admission he was planned for discharged with vital parameters of HR-103 beats/min and oxygen saturation as SpO2- 98%. No oxygen support was required at the time of discharge.

2.4.2. Physical functional assessment as followed:

A] 6 min walk test:

- Six minute walk distance = 250m, indicating 51.33 % of predicted distance, No rest pause was taken.
- Rated dyspnea on Modified Borg scale as grade 2.
- Heart rate increased to 117 beats/min and SpO2 dropped to 91% post test.

B] 1 min sit to stand test:

- Repetitions performed: 21

- One rest pause was taken.
- Rated dyspnea on Modified Borg scale as 1.
- Heart rate was increased to 124 beats/min and SpO₂ dropped to 90% post test.

C] Single leg stance time: 21 sec and 5 sec for right and left lower extremity respectively, which was markedly reduced.

D] Breath holding time: 10 sec only.

2.5. Case 5

A 52-year-old male, shopkeeper by occupation, was admitted with positive RTPCR test on 09/09/2020 in COVID-19 specific ICU and presented with chief complaint of fever, cough, stomach pain, chest pain since 3 days before admission and presented with HR-113 beats/min and SpO₂ - 91 %.

- Patient had comorbidities: HTN and DM
- Patient underwent conservative medical treatment comprising:

Inj Piptaz, Methylprednisolone, Heparin, Tab. Zinc, Tab. Vit C, Tab. Vit D and A, Metformin, Remedesivir, Tab. Multivitamin

2.5.1. Physiotherapy treatment which included:

- Positioning.
- Breathing exercises.
- Early mobilization: in bed mobilisation, upper limb mobility exercises, marching and walking monitored.

On 20/09/2020 i.e. 11th day of hospital admission he was planned for discharged with vital parameters of HR- 75 beats/min and oxygen saturation as SpO₂- 99%. No oxygen support was required at the time of discharge.

2.5.2. Physical functional assessment as followed:

A] 6 min walk test:

- Six minute walk distance = 210m, indicating 34.15 % of predicted distance, No rest pause was taken.
- Rated dyspnea on Modified Borg scale as grade 3.
- Heart rate increased to 119 beats/min and SpO₂ dropped to 96% post test.

B] 1 min sit to stand test:

- Repetitions performed: 15
- No rest pause was taken.
- Rated dyspnea on Modified Borg scale as 2.
- Heart rate was increased to 97 beats/min and SpO₂ dropped to 92% post test.

C] Single leg stance time: 4 sec and 2 sec for right and left lower extremity respectively, which was markedly reduced.

D] Breath holding time: 17 sec only.

2.6. Case 6

A 32-year-old male, teacher by occupation, was admitted with positive RTPCR test on 07/09/2020 in COVID-19 specific ICU and presented with chief complaint of cough and breathlessness since 4 days before admission and presented with HR - 88 beats/min and SpO₂- 90 %.

- Patient had comorbidities: HTN and IHD
- Patient underwent conservative medical treatment comprising:

Vit C, D and A, Zinc, T pan 40, T Asprin, Clopتاب, Atorvas, Amlo, Emset. Multivitamin.

2.6.1. Physiotherapy treatment which included:

- Positioning
- Breathing exercises.
- Early mobilization: in bed mobility comprising heel slides, bridging and bed side mobilisation of UL and LL is done in initial phase, eventually walking is monitored.

On 18/09/2020 i.e. 11th day of hospital admission he was planned for discharged with vital parameters of HR- 59 beats/min and oxygen saturation as SpO₂- 99%. No oxygen support was required at the time of discharge.

2.6.2. Physical functional assessment as followed:

A] 6 min walk test:

- Six minute walk distance = 210m, indicating 37.50% of predicted distance, No rest pause was taken
- Rated dyspnea on Modified Borg scale as grade 2.
- Heart rate increased to 65 beats/min and SpO₂ dropped to 96% post test.

B] 1 min sit to stand test:

- Repetitions performed: 25
- No rest pause was taken.
- Rated dyspnea on Modified Borg scale as 1.
- Heart rate was increased to 85 beats/min and SpO₂ dropped to 95% post test.

C] Single leg stance time: 2 sec and 3 sec for right and left lower extremity respectively, which was markedly reduced.

D] Breath holding time: 28 sec only.

Table 1: Characteristics of cases with COVID-19.

Characteristics	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Age (years)	74	57	52	53	52	32
Height (cm)	162.56	162.56	175.26	154.94	165.1	177.8
Weight (Kg)	65	48	60	63	68	82
BMI (Kg/m ²)	25.7	18.2	19.5	26.9	24.9	25.9
Gender	M	M	M	M	M	M
Comorbidities	HTN,DM	HTN,DM,IHD	-	HTN,DM	HTN,DM	HTN,IHD
Addictions	-	-	-	-	Alcohol	-
Occupation	Retired office clerk	Manual worker	Field work officer	Clerk	Shopkeeper	Teacher

Table 2: 6MWT parameters of COVID-19 patients.

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Pre HR	112	88	145	110	75	59
Pre SpO ₂	90	99	89	99	99	99
Pre RPE	0	0	0	0	0	0
Post HR	114	90	84	117	119	65
Post SpO ₂	89	96	85	91	96	96
Post RPE	3	2	2	2	3	2
Distance covered in m	150	280	180 with 1 rest pause	250	210	250
% predicted distance	34.82	50.79	27.64	51.63	34.15	37.5

Table 3: 1 Min sit to stand parameters of COVID-19 patients.

	Case1	Case 2	Case 3	Case 4	Case 5	Case 6
Pre HR	112	81	145	103	75	59
Pre SpO2	90	97	95	98	99	99
Pre RPE	0	0	0	0	0	0
Post HR	104	106	157	124	97	85
Post SpO2	89	94	83	90	92	95
Post RPE	1	1	2	1	1	0
No. of repetitions	15	20	13	21	15	25

Table 4: Single leg stance time and breath holding time of COVID-19 patients.

	Case1	Case2	Case3	Case 4	Case 5	Case 6	Mean
Single leg stance time -right extremity (in sec)	5	2	7	21	4	2	6.83
Single leg stance time -left extremity (in sec)	5	5	3	5	2	3	3.83
Breath holding time (in sec)	7	12	28	10	17	28	17



Figure 1and 2: Assessment of 1 min Sit to stand in COVID-19 patient.



Figure 3 and 4: Assessment of 6MWT in COVID-19 patient.



Figure 5: Assessment of single leg stance in COVID-19 patient.

3. Discussion

The purpose of this case series is to assess the physical function of COVID-19 patients who are planned for discharge to form a baseline criteria for physiotherapy management. Evidence shows that physical function is affected in COVID-19 patients [12]. This affection of physical function has an effect on their ADLs and their ability to participate in society. The role of physiotherapist is to enhance this physical function and improve quality of life. All 6 cases showed reduction in functional capacity which affected patient's day to day activities such as walking and getting up from a chair. Hence there is a need to evaluate their physical function to improve the QOL.

In this study we have assessed physical function through 6MWT, 1 min STS, SLS and pulmonary function through breath holding capacity. 6MWT is a widely used assessment tool for exercise tolerance in patients with cardio-pulmonary diseases. As most ADLs are performed at submaximal levels, the 6MWD reflects the functional exercise capacity of everyday physical activities. It evaluates the global integrated response of all the body systems [13]. 1 min sit to stand test measure lower body muscular strength and endurance to evaluate mobility and to detect low exercise capacity [15]. It provides a basis for counseling on effective training and rehabilitation [14]. The 6MWT is already validated for young people and it is the most commonest for assessing the functional capacity in clinical setting but, it has troublesome logistical requirements such as 30 meter corridor and it is time consuming and occasionally it may be difficult to test the individuals with severely limited mobility with the 6MWT but STS test requires minimal equipment and it's easy to perform [16]. The STS test is a measure of mobility related function and physical performance [17]. A slow STS activity requires 4.5 METs for frequency of 10 times/min similarly walking 5.6 km/hr utilizes 4.5 METs therefore STS activity can be performed instead of walking but further studies should be conducted regarding same [18,19].

Single leg stance test quantifies standing balance as it is important dependent variable in all instrumental activities. Breath-holding time has been used in respiratory physiology as a measure of ventilatory response. It is directly proportional to the lung volume at the onset of breath-holding, partly because this has a major influence on oxygen stores. Therefore pulmonary function is assessed by breath holding time. Even if baseline parameters were stable when patients performed activities like walking or sit to stand there were fluctuations in heart rate and oxygen saturation. This made patients more prone to risk of becoming hypoxic while performing ADLs which affected their physical functioning and will affect participation in society.

In this case series all 6 cases showed reduced % predicted distance through 6 min walk test. In that, case 2,3,4 and 5 as showed in Table 1 are in age group of 52-57 years showed 50.79%, 27.64%, 51.63%, 34.15%, of % predicted distance respectively. Case 1 is 74 years old and case 6 is 32 years young adult but irrespective of age both showed reduced % predicted distance 34.82% and 37.5 % respectively. From all the 6 cases only 2 patients were able to perform just above 50% of their % predicted distance. Case 3 showed drastic reduction in % predicted distance due to sudden drop of heart rate by 52 beats/min with rest pause of 1 min 20 sec due to dyspnea indicating reduced functional capacity. Oxygen saturation drop of 3% which is significant enough, was documented in all cases. This indicates reduce cardio-pulmonary endurance in COVID-19 patients. But in case 4 as shown in Table 2 even if % predicted distance is 51.63% which is more compare to rest of the cases, showed more reduction in oxygen saturation post test which is 9%, on other side case 1 showed only 1% drop in oxygen saturation even if % predicted distance is 34.82%. This indicates 6MWD is not only a

dependent variable of drop in oxygen saturation but other factors such as myalgia, deconditioning, fear of walking fast may contribute to it.

In COPD patients reduction in 6MWD was reported with mean value of 389 ± 113 m in a study done by Ciro Casanova et al [20]. A similar reduction in 6MWD was also found in a study done by Roland M. du Bois et al in patients with pulmonary fibrosis with mean value of 394.2 ± 108 m [21]. On comparison with both the studies this case series showed greater reduction in 6MWD in COVID-19 patients.

Patients also showed reduced no of 1 min sit to stand repetitions. Case 2, 3, 4 and 5 who were in age group of 52-57 years showed 20,13,21,15 repetitions, with mean of 14.75 repetitions. Case 1 (74 years old) and 6 (32 years old) showed 15 and 25 repetitions respectively. Post 1 min sit to stand test there was drop in oxygen saturation and increase in heart rate. Case 1 took one rest pause in between due to dyspnea. These results indicate decrease strength of lower extremity as well as reduce physical performance. Out of 6 cases in 4 cases STS is altered with strategy of increase forward trunk flexion as a compensatory movement pattern. These compensatory strategies demand more oxygen supply and increase energy consumption. Therefore for effective utilization of oxygen with optimal energy consumption these compensatory strategies should be addressed in treatment interventions.

Morita et all reported a mean value of 27 ± 6 repetitions of 1 min sit to stand in mean age group of 68 ± 8 years in COPD patients [17]. When compared with population age of this case series (which is lower than above mentioned study) COVID-19 patients showed significant reduction in repetitions performed. Hulya Nilgun Gurses et all also reported mean of 45.2 ± 9.56 repetitions of 1 min sit to stand in age group of 21.7 ± 1.2 years ,a study done in young healthy adults [22], similar to age of Case 6 but when compared showed significant reduction too. Another study done among population of India which showed similar findings as our study with mean age group of 58.88 ± 4.99 years in COPD population, resulted mean of 15.3 ± 10.96 repetitions for 1 min sit to stand [23]. Indicating reduced sit to stand functional capacity in COVID-19 patients.

Single leg stance time showed mean of 6.83 sec on right extremity and mean of 3.83 sec on left extremity, inferencing extremely reduce single leg stance time in COVID-19 patients. Bahanmon R et all in a meta-analysis reported normative value of unipedal stance time of 15.7 sec from individuals above 60 years of age [15]. Even if our case series age group is younger than above mentioned study, when compared showed significant mitigation. A study done among US population indicating normative value of one leg stance time with eyes open for 50-59 years age group in which majority of our patients with COVID-19 in this case series fall into, indicates mean value of 41.2 sec indicating extremely reduction in SLS time, inferencing as balance affection and could be reduce lower extremity strength too [24]. Thus further studies need to be addressed the assessment of lower extremity strength to further understand the reduce strength affection. Reduce one leg standing ability also indicates reduce core strength [25]. With deconditioning, unassessed lifestyle habits and postural adaptations, reduce core strength can be seen in COVID-19 patients. Therefore its assessment is necessary to address in physiotherapy treatment plan.

In this case series, mean value for breath holding time was 17 sec as reported in above Table no 4. A study done amongst population of India in non-smokers showed 52.7 ± 0.5 sec of normative values for breath holding time and smokers showed 29.3 ± 7.39 sec, which indicates reduction in breath holding time due to smoking but lung function is markedly more affected in COVID-19 patients even compared to this parameter [26]. Therefore significant reduction of breath holding time is noted in COVID-19 patients. Breath holding time indicates pulmonary function. Thus affection of pulmonary function is noted.

In all the above assessment parameters all 5 cases except case 3 had comorbidities still, case 3 showed drastic changes in vital parameters even with absence of comorbidities. Resting tachycardia is documented as 145 beats/min and 89% oxygen saturation then sudden drop heart rate 84 beats/min was noted after walking with 85% oxygen saturation. While performing sit to stand activity heart rate increased to 157 beats /min with drop of oxygen saturation to 83%. Therefore even in the absence of comorbidities patient showed varied parameters when activities are performed.

All the above pre-discharge assessment indicates markedly affected physical function. This will affect patient's ability to perform ADLs and participate in society. Thus affecting QOL in COVID-19 patients. Therefore necessary guidance for rehabilitation is required even after discharge in COVID-19 patients. Also this physical function assessment can be used as a baseline assessment to plan physiotherapy treatment interventions and home programme can be advised according to patient's performance with monitoring as inclusion of same interventions like walking and sit to stand activity through tele rehab can be included till patient is able to attend physiotherapy OPD for post COVID rehabilitation. All patients responded variably to each physical function assessment therefore individualized functional training in

necessary in physiotherapy management. Thus physiotherapy rehabilitation is an important key in post-COVID-19 phase of patient.

4. Abbreviations

COVID-19: Coronavirus Disease 19; ADL- Activities of daily living; STS- Sit to stand; SLS- Single leg stance; 6MWT/6MWD: 6 Min walk test/distance; BHT: Breath holding time; QOL: Quality of life and ICU: Intensive Care Unit

5. Conclusion

In this case series, all 6 cases showed reduce physical function through reduced 6MWD , decrease no of 1 min sit to stand repetitions, reduce one leg stance and affection of pulmonary function through reduce breath holding time. This will affect their ADLs and participation in society. Their assessment of physical function hence can be used as a baseline parameter to plan physiotherapy management to improve quality of life in COVID-19 patients. Therefore in post discharge phase of COVID-19 patients physiotherapy rehabilitation is necessary with appropriate monitored home programme.

Compliance with ethical standards

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Disclosure of conflict of interest

None.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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