



EXERCISE REHABILITATION FOR LONG COVID INDUCED DYSPNOEA AND FATIGUE IN A KIDNEY TRANSPLANT RECIPIENT: A CASE REPORT

Physiotherapy

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ABSTRACT

Kidney transplant recipients are at a higher risk to develop serious health risks from coronavirus disease 2019 (COVID-19), perhaps increasing the risk of presenting its long-term clinical complications, labeled as LONG-COVID. **Case Report-**A 64-year-old male post kidney transplant (dual kidney) recipient with stable graft function was referred to physiotherapy department with chief complain of fatigue, lethargy, dyspnoea on exertion and chronic back pain in March 2022. The patient was vitally stable at rest on room air. He was obese and had comorbidities Type 2 DM. We reported long COVID symptoms improved/ resolved with exercise and present exercise training as a therapeutic strategy for management of long COVID syndrome. Cardiopulmonary rehabilitation consisting of continuous aerobic and resistance training of mild to moderate-intensity improved pulmonary function, aerobic capacity, exercise tolerance, fatigue, and strength in long-COVID-19 post kidney transplant patient.

KEYWORDS

Long COVID; Kidney Transplantation; Exercise; Physical Activity; Rehabilitation

INTRODUCTION

“Long COVID” is a term used to describe presence of various symptoms, even weeks or months after acquiring SARS-CoV-2 infection irrespective of the viral status. It is also called “post COVID syndrome”. It can be continuous or relapsing and remitting in nature. There can be the persistence of one or more symptoms of acute COVID, or appearance of new symptoms [2] Common symptoms in people with “Long COVID” are profound fatigue, breathlessness, cough, chest pain, palpitations, headache, joint pain, myalgia and weakness, insomnia, pins and needles, diarrhea, rash or hair loss, impaired balance and gait, neurocognitive issues including memory and concentration problems and worsened quality of life. In people with “Long COVID” one or more symptoms may be present. [2]. Profound fatigue is the most common symptom in most people with Long COVID.[3]

The National Institute of Health and Care Excellence has coined the term “post-COVID syndrome” for persistent symptoms and signs beyond 12 weeks of illness onset which could not be explained by an alternative etiology. Recent literature also divides post-COVID patients into subacute or ongoing symptomatic COVID (4-12 weeks beyond acute COVID-19) and chronic COVID or Post-COVID syndrome (symptoms persisting beyond 12 weeks of onset of acute COVID-19)[3]

Kidney transplant recipients (KTR) are a high-risk group for severe COVID-19, whose case fatality ratio may reach up to 30%, owing not only to their chronic immunosuppression, but also to older age and frequently associated comorbidities, including hypertension, diabetes mellitus, chronic kidney disease, and cardiovascular complications [4]

CASE REPORT

We present a case of 64-year-old male patient visited physiotherapy rehabilitation department on 12/3/2022 with reference from nephrologist. He had chief complain of fatigue, lethargy dyspnoea on exertion & chronic back pain in the past 6 months

He had undergone dual kidney transplantation in 2008 with stable graft function and co-morbidities included TYPE 2 DM since 2017. He suffered from Covid-19 in October-2021. Kept on 3 litres O2 mask. Admitted in Tertiary Care Hospital for 21 days.

His physical and cardiovascular examination was normal. The patient's vitals were stable. He had endomorphic build with major abdominal obesity. Hip-waist ratio- 1.04(HIGHER RISK). BMI- 31.8(OBESE CLASS 1). Initial laboratory findings showed elevated Serum Creatinine (2.12) and HbA1c (6.9%) lactate dehydrogenase (223U/L) whereas other laboratory findings (CBC, Urine R/M, ESR, other biochemical tests) were in the reference range.

On subjective evaluation, the dyspnoea was sudden in onset, associated with exertion or any type of accustomed activity. Grade III (according to NYHA scale). There were episodes of unproductive cough which was occasional, mild single weak cough, not associated with breathlessness. However, there were no complains of sputum, chest pain, oedema.

MRI findings were suggestive of L2-L3 level bilateral facet joint arthropathy & ligamentum flavum hypertrophy, diffuse disc bulge, and compression over left exiting nerve roots. Unilateral (left sided) spondylolysis of L5 vertebrae with Grade I at L5-S1 level

To assess patient's current status, these were the objective tests performed-

1. 5 Times Sit To Stand Test

The 5-STS test (i.e., five stand-ups and sit-downs in a row performed as quickly as possible without using arms) is used in rehabilitation programs and in healthy older community-living populations. The test is reliable, valid, and partially dependent on leg-muscle force and balance. The patient was able to do 5 times STS test in 23 seconds.

2. Six Minute Walk Test

In six minute walk test (6MWT), patient walked as fast as possible in a 30 m corridor, without running, for 6 minutes. The test was interrupted if the patient reported dizziness, cramps, chest pain, severe dyspnoea, sweating, or pallor.

6-minute walk test (6-MWT) parameters were reduced range (distance-255 metres; oxygen saturation 96%; Borg scale 6), according to current guidelines. [7,9]

Respiratory rate, Blood Pressure, Oxygen saturation and Rating of perceived exertion (RPE Scale) was measured pre, post and after recovery (after 2 minutes) of testing. He had to take rest for 2 times (after 2.5 min for 1 min and after 4 min for 2 min) during the whole test.

3. Pulmonary Function Testing

Pulmonary Function Testing (forced expiratory volume in 1 second (FEV1) 65.6%; forced vital capacity (FVC) 57.2%, FEV1/FVC ratio 114.4% showed moderate restriction, mostly ruling out asthma.

4. Fatigue Severity Scale

9-item scale which measures the severity of fatigue and its effect on a person's activities and lifestyle in patients consisting of answering a short questionnaire of her own level of fatigue that are scored from 1 (strongly disagree) to 7 points (strongly disagree) with a maximum total score of 63 points. Patient scored 46 which signifies moderate fatigue

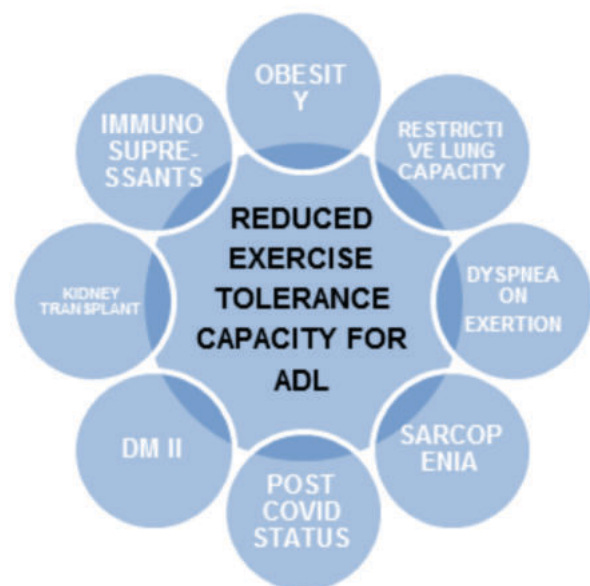


Figure 1: Factors Affecting Activities Of Daily Life

Physiotherapy Intervention

Figure 1 shows multiple problems associated with patient's REDUCED EXERCISE TOLERANCE CAPACITY FOR ADL

Figure 2 Resembles Cardiopulmonary rehabilitation protocol for post-COVID-19 patient.

He completed individualized supervised endurance, strength, and inspiratory muscle training over a 12-week period (6 WEEKS IN HOSPITAL+ 6 WEEKS AT HOME UNDER SUPERVISION). Frequency: 5 days/week. Intensity was low to moderate that is 40-60 % of maximum heart rate and RPE: Modified Borg Scale (3-6), Duration: 30-45min/day. Type: Multimodal circuit interval training.

The exercises were progressed in terms of intensity, duration and speed which was done according to patient's capacity. Vital parameters such as Respiratory rate, Blood Pressure, Oxygen saturation and Rating of perceived exertion (RPE Scale) were measured during training sessions.

For pain management- Lumbar Traction, 4 pole Interferential Therapy Current, Isometric Abdominal and Isometric Back Exercises and McKenzie's exercise. Patient was advised to wear lumbosacral belt during all the exercises. Back care advices and posture correction techniques were taught.

Figure 2: Multi-modal Exercise Protocol

	Breathing Retraining (5 Days A Week)	Warm Up (5 Days A Week)	Aerobic Training (4 Days A Week)	Resistance Training (once A Week)	Cool Down (5 Days A Week)
Exercise Protocol	-Spirometry -Pursed lip Breathing -Diaphragmatic Breathing -Thoracic Mobility and Thoracic Expansion Exercises -Butterfly Exercise	-Spot Marching -Arm Circles	-Static Cycling -Treadmill -Walking -Arm Cycling	-Sit To Stand -Wall push ups -Bridging -Back & Side Kicks -Half Squats -Shoulder Strengthening Exercises	-Dyspnoea Relieving Positions -Breathing Control -Savasana

Supplemental Home Exercise Plan

The patient participated in home exercise plan for 6 weeks including aerobic training, resistance exercises, and breathing techniques. He performed exercises at home targeting at least 30-45 minutes per day with mRPE ≤ 6 to be completed 5 days per week under the supervision

of physiotherapist.

He gradually increased time participating in exercises and activities at home. To ensure adherence to home program, a compliance sheet for recording the exercise parameters was provided.

DISCUSSION

Long COVID' is a complex, multifactorial illness that describes the residual effects of the acute COVID-19 infection.[1] Kidney transplant patients are at higher risk of unfavourable outcomes from COVID-19, showing at least 10 times higher fatality rates, probably associated with the chronic use of immunosuppressive drugs and a higher number of comorbidities. Considering this more aggressive course of the acute illness, it is reasonable to hypothesize that long-term effects could be more prevalent than in the general population.[8]

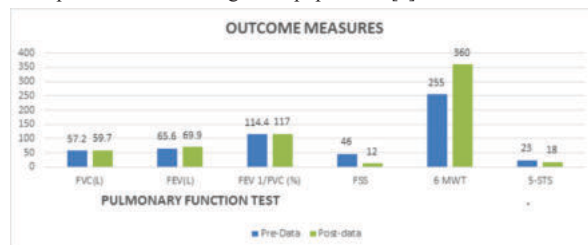


Figure 3: Fss = Fatigue Severity Scale, 6mwt = 6 Minute Walk Test, 5-sts = 5 Times Sit To Stand

In our case, patient had common complaints of dyspnoea, profound fatigue and general weakness with inability to carry out work, an individualized exercise program which included patient education, energy conservation during daily physical activity, breathing strategies recruiting diaphragm to improve ventilation, use of assistive device (incentive spirometer) was incorporated. Dyspnea was characterized by rest period during the 6MWT, which indicated a state of discomfort. A structured aerobic exercise program which included walking progression and low-level resistance training for muscle performance improvement was initiated and progressed gradually. The findings in this case report demonstrate that at the end of the comprehensive rehabilitation program, marked improvement in his ability to carry out work and overall general well-being was noticed. Figure-3 states that there is significant improvement in the subject's pulmonary function, fatigue, aerobic capacity and muscular strength after the rehabilitation. He had minimal to no symptoms of dyspnoea and fatigue with which he had presented, towards the end of 12 weeks.

Nopp S et al. concluded that in patients with long COVID, exercise capacity, functional status, dyspnea, fatigue, and quality of life improved after 6 weeks of personalized interdisciplinary pulmonary rehabilitation [5] Bruna T. et al. concluded that Rehabilitation improved lung function, respiratory muscle strength, maximal and submaximal exercise tolerance, fatigue, and quality of life of patients post-COVID-19.[6]

In investigator's knowledge, no study has evaluated long covid rehabilitation in post kidney transplant recipient. There is lack of evidence about the standard protocol for the rehabilitation of post kidney transplant recipients with Long Covid, so there is a need for more such case studies on patients and develop the guidelines for the post kidney transplant recipients.

CONCLUSION

Long covid hampers individual capacity to resume to pre covid functional status. There may be number of factors that may be associated with it. The present case shows physiotherapy along with medical management does prove beneficial in improving functional capacity, ability to carry out daily chores and participation in society. Physiotherapy interventions directed towards respiratory exercises, muscle endurance and strength training, energy conservation, physical and functional independence training and patient education procure in better recovery from long covid.

Future Recommendations

Finally, in the absence of contraindications, this program can be incorporated into management of patients considering their baseline functional capacity — sedentary versus active—because the level of intensity and duration of exercise are very low initially and gradually

increase over time.

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