CASE REPORT

Effect of Telerehabilitation in a Patient with Pulmonary Tuberculosis: A Case Study

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Abstract

Tuberculosis (TB) is one of the top communicable diseases responsible for more deaths worldwide. Patients with pulmonary TB (PTB) suffer from lung damage, including fibrosis, cavitation, muscle weakness, and other radiological changes, leading to decreased lung function, quality of life (QoL), breathlessness, and physical and psychological impairments. So, the Present case study of a 58-year-old female with sputum-positive PTB suffering from breathing difficulties after the start of anti-TB treatment (ATT) was given online pulmonary rehabilitation therapy. The present study aimed at assessing the effect of yoga and respiratory care therapy (RCT) on PTB patients. This study is unique and rare in terms of integrating two rehabilitation therapies—yoga and RCT for the betterment of patient care. The patient was administered 45 minutes of yoga and 15 minutes of RCT per day for 8 weeks and baseline and postdata were collected. Results after 8 weeks of telerehabilitation therapies were found to be positive compared to baseline parameters. In short, this case report highlights the potential benefits of telerehabilitation as a dual complementary therapy in patients with PTB along with a standard of care to improve the saturation of peripheral oxygen (SpO_2) saturation levels, breath holding time, Borg rating of perceived exertion (RPE) scale scores, 6-minute walk test, and decreased heart rate. Future studies planned with more sample sizes, multicentric in nature, and randomized control trials can be planned to warrant the results.

Keywords: Case report, Pulmonary tuberculosis, Respiratory care therapy, Telerehabilitation, Yoga.

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Introduction

Tuberculosis (TB) is one of the top 10 communicable diseases responsible for deaths worldwide.[1] As per the World Health Organization 2022 statistics, >10 million were affected by TB, and 1.6 million deaths occurred due to TB.[2] TB disease primarily affects the lungs [pulmonary TB (PTB)] and the other parts of the body (extrapulmonary). Usually, people with PTB suffer from lung damage, including fibrosis, cavitation, and other radiological changes. This can lead to decreased lung function, quality of life (QoL), breathlessness, and physical and psychological impairments.[3–6]

Most of the present research studies concentrate on the diagnosis and mycobacterial activities related, and very few studies as complementary or add-on therapies that answer pulmonary rehabilitation. It is the present need for this study to give pulmonary rehabilitation along with standard care. This study is unique and rare in integrating two rehabilitation therapies, yoga and respiratory care therapy (RCT) to improve patient treatment.

The present case study aimed at assessing the effect of yoga and RCT on PTB patients.

Case Description

A 58-year-old female from Kolar approached through a referral for telerehabilitation. She was sputum-positive TB with mild symptoms and started anti-TB treatment (ATT) and stayed at home as per the pulmonologist's advice. On her 4th day of treatment, she was experiencing breathing discomfort. Due to increased breathlessness, she was seeking rehabilitation for symptom management. She visited the Department of Pulmonology at RL Jalappa Hospital and Research Centre, Karnataka, India. Baseline parameters were collected, and after confirming with a pulmonologist, yoga therapy, and pulmonary rehabilitation were started with possible online supervision (telerehabilitation). She complained of breathlessness, minimal activity going to the washroom, frequent nonproductive

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cough, and occasional productive cough with productive sputum. No history of bronchial asthma and diabetes mellitus. Possible assessment–room air saturation of peripheral oxygen (SpO_2)—93% and during exertion 85–88% SpO_2 with nonproductive cough. Her breath-holding time was 11 counts. The patient gave consent before induction into this study.

Intervention

The patient has undergone 45 minutes of yoga and 15 minutes of respiratory rehabilitation by trained yoga and respiratory therapists. Yoga was performed in the morning hours between 7:00 and 8:00 AM, along with 15 minutes of respiratory rehabilitation. A validated integrated module was given to practice every day, and the same has been monitored through video calls. Yoga consists of breathing exercises, loosening exercises, asanas, and deep relaxation techniques as shown in Figure 1. The respiratory rehabilitation consists of warm-up, aerobic activity, pursed lip breathing, stretching, and relaxation as shown in Figure 2. Initially, the patient felt breathless and tired from doing both practices, but later, she could practice without any breaks with continuous practice.

The intervention effect was measured at baseline, and the posteffect was measured after eight weeks of revisiting the hospital as shown in Flowchart 1.

Fig. 1: Patient doing yoga in the sitting position

Fig. 2: Patient performing respiratory therapy breathing exercises

Parameters of Assessment

It was a pre–post design to determine how the treatment efficacy would change before and after the treatment along with the ATT so SpO_2, heart rate, breath holding time, Borg rating of perceived exertion (RPE) scale, pulmonary function test, and 6-minute walk test would be taken as the parameters for assessment. The following parameters were assessed using the different assessment methods/tools, as shown in Table 1.

Results

After 8 weeks of yoga and RCT for the patient, outcome measures were obtained. There is an increase in SpO_2 from 91 to 97% at room temperature, breadth holding time from 12 to 19 counts with minimal cough, and a 6-minute walk distance (6MWD) test from 220 m in the initial stage to 385 m after the rehabilitation therapy. In the same way, decreased heart rate from 116 beats per minute to 101 beats per minute, Borg scale scores from 5 at the baseline to 2 at the end of 8 weeks. Increased pulmonary function test values forced expiratory volume in 1 second/forced vital capacity (FEV1/FVC) were observed from baseline prerehabilitation 72.3% to postrehabilitation 77.6%, as shown in Table 2.

Discussion

Pulmonary rehabilitation plays a vital role in most PTB cases as it affects the lungs causing more distress and breathlessness.

Flowchart 1: Flowchart to represent the procedure

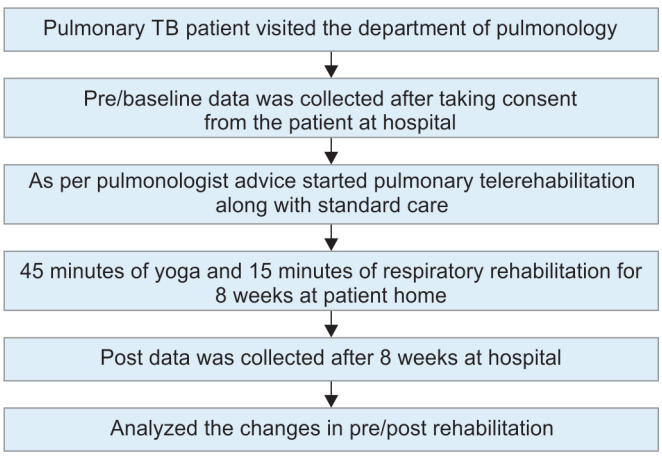

Table 1: Parameters of assessment

Serial number	*Parameters*	*Assessment method*
1	SpO_2	Measured using pulse oximetry device
2	Heart rate	Measured using pulse oximetry device
3	Breath holding time	Breath-holding time is measured after a deep inhalation
4	Borg scale	Borg RPE for measuring physical activity intensity level
5	Pulmonary function test (PFT)	Using RMS Helios 401—spirometer device
6	6-minute walk test	Patients walked in the corridor for 6 minutes

Table 2: Representation of pre–post rehabilitation results

Serial number	*Parameters*	*Prerehabilitation (baseline)*	*Postrehabilitation (after 8 weeks)*
1	SpO_2	91% at room air	97% at room air
2	Heart rate (HR)	116 beats per minute	101 beats per minute
3	Breath holding time (BHT)	12 counts	19 counts with minimal cough
4	BOrg scale	5	2
5	Pulmonary function test (PFT)	FEV1/FVC (%) = 68.78%	FEV1/FVC (%) = 77.6%
6	6-minute walk test	220 minutes	385 minutes

The use of telerehabilitation in PTB management is a relatively new concept. This case report demonstrates the feasibility and effectiveness of using telerehabilitation to provide rehabilitation services to PTB patients. Tele-yoga is a need of the hour and it has been found beneficial in coronavirus disease 2019 (COVID-19),[7] chronic obstructive pulmonary disease (COPD),[8] interstitial lung disease (ILD),[9] and stress management.[10] So previous studies through tele-yoga and telerehabilitation for COPD patients show improvement in 6MWD, anxiety, and depression.[8] As per the meta-analysis, telerehabilitation for chronic respiratory disease and treatment center-based pulmonary rehabilitation show similar results without any safety issues.[8] Telerehabilitation probably improves functional exercise capacity, dyspnea, and QoL in the short term, with potential benefits in idiopathic pulmonary fibrosis. Improvements in functional exercise capacity, dyspnea, and QoL were sustained longer term.[9] Yoga was found beneficial in the form of a tele-yoga approach in different respiratory and other disease conditions by improving lung capacities, QoL, stress, anxiety, and depression. Majorly telerehabilitation mainly helps control the spread of PTB disease. At the same time, daily travel to the hospital increases the chances of spreading TB and incurs traveling charges. So telerehabilitation helps in convenient practice, reduces travel costs, and reduces tiredness. It shows that tele-yoga and tele-respiratory rehabilitation have beneficial roles for PTB patients. The limitation is a case study, but future telerehabilitation studies with robust methodology and sample size may be planned.

Conclusion

Telerehabilitation has emerged as a promising alternative for PTB patients who face challenges in accessing healthcare facilities. This case report describes the successful use of telerehabilitation in the treatment of a patient with pulmonary TB by improvement in the SpO_2 saturation levels, breath holding time, Borge scale scores, pulmonary function values, 6-minute walk test, and decreased heart rate. So, this case report highlights the potential benefits of telerehabilitation as a dual complementary therapy in patients with PTB along with standard of care. Future studies with more sample sizes and randomized control trials can be planned to warrant the results.

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