



Barriers and Challenges of Home-Based Pulmonary Rehabilitation in Post Pulmonary Tuberculosis Patients

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Abstract:

Post-Pulmonary Tuberculosis (post PTB) disorder encompasses various manifestations after successful treatment of tuberculosis such as respiratory symptoms, decline in respiratory function, residual radiological lesions (Fibrotic strands, calcification, fibrosis, cavity, and bronchiectasis) that leads to exercise intolerance and reduced health related quality of life (QoL). The aim of our study is to assess the barriers and challenges of implementing home-based pulmonary rehabilitation for post pulmonary rehabilitation patients by using validated questionnaire tool. The study included 44 subjects diagnosed with post pulmonary tuberculosis disorder and completed atleast 6 weeks of home-based pulmonary rehabilitation (HBPR) and visiting out-patient department of respiratory medicine. In total of 44 participants with post PTB most of the post PTB participants accounted 90.9% (22) lack of knowledge/awareness about PR as a primary barrier for HBPR and 41(93.2%) participants faced duration of HBPR is a major challenges, followed by lack of social support 38(86.4%). Our study suggests that HBPR for patients with post PTB is a complex process and lacks majorly knowledge and awareness of patients with post PTB however it could be improved by awareness program and education from healthcare workers and stake holders.

Keywords: Barriers, Home-based rehabilitation, Challenges, Post PTB

Background:

Globally, pulmonary tuberculosis (PTB) remains top ten causes of mortality and morbidity that accounts approximately 10 million people fell ill with the infection mycobacterium tuberculosis in the year 2019.[1] As per the World Health organization (WHO) in 2019 report 10.00 million of TB cases were reported.[2]

The communicable disease TB is a major health concern and it affect the lungs (pulmonary TB) however it can also affect extra sites (extra-pulmonary TB) such as pleura, lymph, spine, etc... TB is widely represented as an illness of poor, socioeconomic burden and stigma. Currently, TB incidence is declining with 2% every year but the End TB strategy goal is to achieve 4-5% decline annually.[3] Tuberculosis treatment saved lives of 63 million people in 2000 and 2019. As per WHO TB report 2020, half million people enhanced with rifampacin-resistant TB (RR-TB) and multi-drug resistant TB (MDR-TB).[4]

According to the Indian TB report 2022, the estimated TB incidence of all forms in India for the 2020 year was 188 per 100,000 populations, compared to 129-257 per 100,000 populations.[5] Total number of TB cases in 2021. The incidence was 19, 33,381 (both new and relapse), which was 19% higher than the previous year 2020. According to the National Tuberculosis Elimination Programme (NTEP), 21, 02,828 cases were notified and 16,79,267 were successfully treated.[6] The National Health Programmes used five types of drug-resistant tuberculosis: isoniazid (INH)-resistant tuberculosis, rifampicin (RR)-resistant

tuberculosis, multidrug-resistant (MDR) tuberculosis, pre-extensively drug-resistant tuberculosis (pre-XDR-TB), and XDR-TB. Pre-XDR-TB is TB that has developed resistance to rifampicin and isoniazid (MDR/RR-TB) as well as any fluoroquinolone (a type of second-line anti-TB drug). The term pulmonary tuberculosis sequelae or Post-Pulmonary Tuberculosis (post PTB) disorder encompasses various manifestations after successful treatment of tuberculosis such as respiratory symptoms, decline in respiratory function, residual radiological lesions (Fibrotic strands, calcification, fibrosis, cavity, and bronchiectasis) that leads to exercise intolerance and reduced health related quality of life (QoL). Chronic respiratory diseases (CRD) like Chronic Obstructive Pulmonary Disease (COPD), Interstitial Lung Disease (ILD), tuberculosis sequelae[2] and bronchiectasis are not entirely curable however the from the chronic lung disease can be managed and enhanced through holistic approach of Pulmonary rehabilitation.[7] Pulmonary rehabilitation is an essential intervention for chronic respiratory illness and helps to improve debilitating symptoms like dyspnea, reduced exercise tolerance, reduced quality of life and reduced functional capacity.[8] Around 8% to 50% of the CRD patients who are referred to PR program never attend and incompleteness rates of PR ranges 10% to 32%.[9-10] Due to COVID-19 pandemic and lack of access to PR or patient barrier factors. Hence American Thoracic Society (ATS) and European Society (ERS) jointly published modern pulmonary rehabilitation[11] or alternative models for traditional PR that is home-based pulmonary rehabilitation (HBPR) or tele-rehabilitation. Home based PR was proposed as an alternative for traditional centre based PR to easy access of PR and to eliminate traditional PR barrier. Although there are few studies reflect HBPR in India, there is a lack of data on the barriers and challenges of implementing it. Hence, we decided to study the barriers and challenges of implementing home-based pulmonary rehabilitation among post pulmonary tuberculosis patients in South India.

Objective:

Assessing the barriers and challenges of implementing home-based pulmonary rehabilitation for post pulmonary rehabilitation patients by using validated questionnaire tool.

Materials and Methods:

Study design:

A cross-sectional study was conducted through interview with patient after obtaining ethical approval and informed consent from the subjects with post-pulmonary tuberculosis between February 2023, and April 2023. The study included 44 subjects diagnosed with post pulmonary tuberculosis disorder and completed atleast 6 weeks of home-based pulmonary rehabilitation (HBPR) and visiting out-patient department of respiratory medicine in Chettinad Hospital and Research Institute, Chengelpattu district, TamilNadu, India. We assessed the barriers and challenges of home-based pulmonary rehabilitation faced by post PTB by developing validated questionnaire consisting of 20 questions. The survey composed of 9 barrier questions and 4 challenges questions. It was structured and formulated by a 5 member team of pulmonologist and respiratory therapy experts in the field of pulmonary

rehabilitation. The survey was translated into subject's native language (Tamil) by principal investigator. Before subjects started to answer the questionnaire, the aim of the research was provided and no personal information was recorded. The time to complete the interview was 5 minutes. The questionnaire tool contains two pages of structured questions including demographic details, barriers and challenges questions. A demographic detail includes age, gender, marital status, education and previously attended PR details. Barriers section consisted of 9 questions about barriers of PR and other 4 questions about challenges of PR. Both the barrier and challenge questions used yes or no type. Convenience sampling methods were used to include the study subjects with post PTB and completed HBPR.

Statistical Analysis:

Study data were collected and recorded in Microsoft excel version 2007 (MS excel). Recorded data then analyzed using the Statistical Package for Social Sciences (SPSS software, V.25). The categorical variables in the study were presented in percentages and frequencies. Chi-square (χ^2 test) test was used to evaluate the statistically significant between the variables and $p < 0.05$ was considered significant.

Results:

Totally 44 participants with Post PTB and completed HBPR programme asked to attend the interview done between February 2023, and April 2023 in department of respiratory medicine at Chettinad hospital and research institute. Male accounted for 45.5% of the participants and female accounted for 54.5% of the participants. In total of 44 participants with post PTB 68.2% attended combination of both direct supervision of home-based pulmonary rehabilitation and tele-rehabilitation programme, 20.5% participants attended home-based programme and 11.4% participants attended only tele-rehabilitation programme. (Table 1)

Demographic details		Frequency	Percent (%)
Gender distribution	Male	20	45.5
	Female	24	54.5
	Total	44	100.0
Marital Status	Married	40	90.9
	Unmarried	4	9.1
Education	Illiterate	20	45.5
	Primary	6	13.6
	Secondary	4	9.1
	Diploma	5	11.4
	Degree	9	20.5
Have you attended PR before?	Yes	44	100
	No	0	0

Type of PR?	Home	9	20.5
	Tele-rehabilitation	5	11.4
	Mixed of both	30	68.2
Do you have Smartphone?	Yes	34	77.3
	No	10	22.7

Table 1: Demographic details of post pulmonary tuberculosis patients (n=44)

The literacy of participants constituted to be 45% (n= 20) were illiterate, 20.5% (n=9) were degree holders, 13.6% (n=6) were completed primary education, 11.4% (n=5) were diploma holder and 9.1% (n=4) were completed secondary education. (Figure 1)

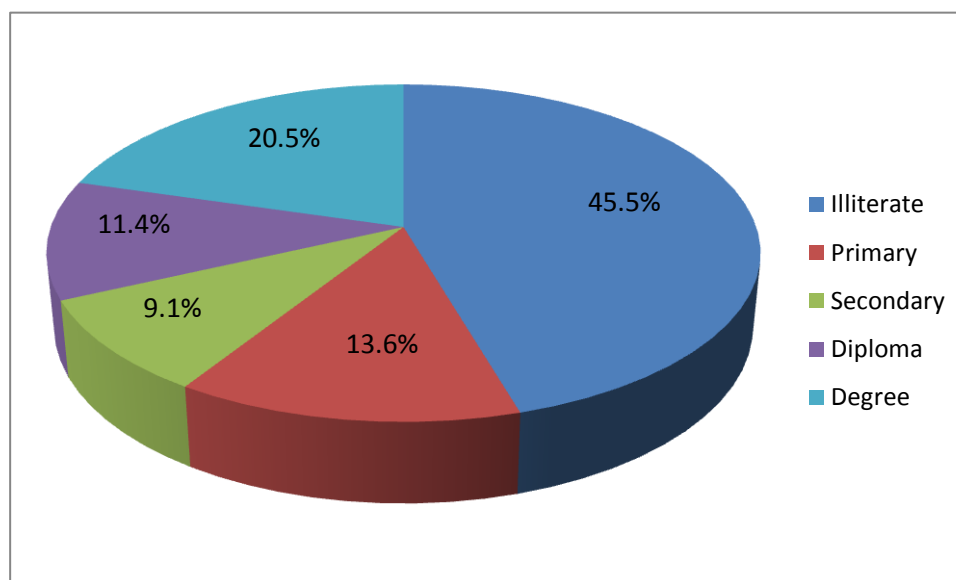


Figure 1: Literacy details among post PTB patients.

Barriers of PR among Post PTB patients:

In total of 9 questions were investigated regarding the barriers of HBPR. Most of the post PTB participants accounted 90.9% (22) lack of knowledge/awareness about PR as a primary barrier for HBPR followed by 79.5% (35) participants accounted lack of perceived benefits, 72.7% (32) participants accounted lack of education, 65.9% (29) post PTB participants accounted that HBPR is not easy accessible, 56.8% (25) participants accounted comorbidities is one the barriers, 50% (22) accounted socioeconomic burden, 20.5% (9) accounted Family problem and 9.1% accounted privacy concern and lack of trained PR professionals as a barriers for HBPR. (Table 2)

Barriers to HBPR		Frequency	Percent (%)
Socioeconomic status	Yes	22	50.0
	No	22	50.0
Family Problem	Yes	9	20.5
	No	34	77.3
Privacy concern	Yes	4	9.1
	No	40	90.9
Lack of education	Yes	32	72.7
	No	12	27.3
Lack of Knowledge/awareness about PR	Yes	40	90.9
	No	4	9.1
Lack of trained PR professionals	Yes	4	9.1
	No	40	90.9
Lack of perceived benefits	Yes	35	79.5
	No	9	20.5
HBPR is not easy accessible	Yes	29	65.9
	No	15	34.1
Co-morbidities is a barrier to HBPR	Yes	25	56.8
	No	19	43.2

Table 2: Barriers of Home-based pulmonary rehabilitation (HBPR) in post PTB patients.

Challenges of Home-based pulmonary rehabilitation among post PTB patients:

When we analyzed factors associated with challenges of HBPR (Table 3), many of the post PTB participants faced duration of HBPR 41(93.2%) is a major challenges, followed by lack of social support 38(86.4%), 32(72.7%) participants faced internet access was challenging and 7(15.9%) faced network issue during HBPR.

Challenges to HBPR		Frequency	Percent (%)
Duration of HBPR	Yes	41	93.2
	No	3	6.8
Network Issue	Yes	7	15.9
	No	37	84.1
Lack of Social Support	Yes	38	86.4
	No	6	13.6

Internet access would be challenging	Yes	32	72.7
	No	12	27.3

Table 3: Challenges of Home-based pulmonary rehabilitation in Post PTB.

Education factor influences HBPR barrier:

Access of home-based pulmonary rehabilitation program is implementing in rural and urban areas. We also analysed education factor of post PTB participants with access to smartphones, lack of education, lack of benefits and not easy to access HBPR. The result showed low literacy participants has the low education level ($p < 0.000$) statistically significant. (Table 4)

Education	Chi-Square	P Value
Access to Smartphone	7.842	0.98
Lack of education	34.169	0.000
Lack of Benefits	3.197	0.525
Not easy to access HBPR	6.022	0.198

Table 4: Factors influencing education and barriers.

Discussion:

This study identified a lack of education, lack of awareness and lack of perceived benefits of PR as a major barrier to home-based pulmonary rehabilitation among post PTB participants. An important aim of HBPR is to increase quality of life, exercise tolerance and functional ability of people impaired by the chronic respiratory diseases (CRD).[12]

Exercise training is a gold standard component of PR that should be maximized and multidisciplinary teams (respiratory therapist, physical therapist and exercise physiologist) are accountable for this component [13]. Our survey is divided into two aspects, which are barrier and challenges of home-based pulmonary rehabilitation. Many barriers are included poor network, lack of education and awareness of PR and co-morbidities. Fischer et al., 2007[13] and Sabit et al., 2008[14] found that imperfect geographical location, rural areas that do not have proper telecom provider networks and inconvenient transportation in COPD patients. According to some studies (Fischer et al., 2007[13]; Garrod et al., 2006[15]; Hayton et al., 2013[16]; persistent illness, the burden of COPD and other diseases, unhealthy mental states, and a lack of expected benefits may be obstacles to adherence to PR. According to the

review by Keating et al., 2011[17] COPD or other diseases could prevent PR from being completed because the patient's health could worsen and force the programme to end midway through. The two other reviews, by Cox et al., 2017[18] and Sohanpal et al., 2015[19] discuss how depressive and unfavourable states can interfere with finishing PR. However, anxiety and depression had no impact on whether patients participated or not, according to Garrod et al. (2006). These reviews noted that the absence of anticipated benefits is a significant barrier, which can be broken down into the following circumstances: Patients believe PR is not required for their mild condition; patients with severe conditions may worry that PR will worsen their condition; however, they did not notice a significant improvement[17,18,19]. The main cause is that patients don't understand their own illnesses and PR well enough, so we need to improve patient health education so that patients have a clear understanding of health. According to Orem et al., 2001[20] health activities that support personal growth can empower patients to independently adopt lifelong health-promoting behaviours. In the current study most of the patients believed that lack of education and awareness are the barriers of HBPR. A survey done by Vogelmeier CF in 2017[21] concluded that nearly half of the study participants believed that "patients might refuse the referral" was a significant obstacle to referring COPD patients to PR, which is consistent with a recent study that included physicians and found that 46% of them believed this to be the case. Similarly, most of the patients responded that lack of social support and duration of HBPR are the challenges in home based rehabilitation. Therefore, healthcare professionals who are part of pulmonary rehabilitation team, stake holders and policy providers should promote pulmonary rehabilitation to post PTB patients knowledge. In accordance with the body of existing literature, study participants also believed that a major obstacle to PR referral was a lack of properly trained staff.[22]

Conclusion:

Our study suggests that HBPR for patients with post PTB is a complex process which faces lack of education, awareness, different personal, duration, social and comorbidites barriers and challenges in implementing HBPR. However, it could be improved by the healthcare professionals, stake holder and policy makers by referrals, advertising and educating the patients.

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Conflict of Interest: NIL

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