Brief Review

The initial steps in pulmonary rehabilitation: How it all began?

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ABSTRACT

Pulmonary rehabilitation plays a vital role in improving symptom, thereby enhancing health-related quality of life in patients with chronic obstructive pulmonary disease. We here with review is highlighting the landmark changes and recommendation for pulmonary rehabilitation since inception to till date. We also discuss the utilization of oxygen therapy, various measures of exercise training, and adherence strategy recommendation for betterment of the patient performance in their activity of daily living life.

KEY WORDS: Chronic obstructive pulmonary disease, exercise training, history, respiratory physiotherapy

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INTRODUCTION

Rehabilitation in respiratory disease particularly for chronic obstructive pulmonary disease (COPD) is in existence for the last seventy decades. The COPD was a significant public health concern with dyspnea being a hindrance for routine physical activity. In the initial days, the rehabilitation aimed at relieving the dyspnea to facilitate the activities of daily living.

In the year of 1936, Barach and Eckman[1] suggested the use of heliox for patients with emphysema and asthma to overcome the dyspnea on exertion. In 1950, they developed strategies to prevent disuse atrophy of muscles using a lightweight O_2 cylinder by promoting ambulatory O_2 therapy. Concurrently, their team promoted the use of home O_2 therapy with a 50-foot length rubber oxygen tubing for better accessibility of home activity. The above technology was named as O_2 exercise regimen, and this research was published between 1959 and 1964.[2,3]

In the late 1960, Petty *et al*.[4,5] developed a program called "standardized outpatient program of pulmonary rehabilitation" consisting of various components such as patient individualized information of their disease, airway clearance introduction to their treatment protocol, breathing retraining, physical conditioning, drug therapy, and use of supplementary O_2 therapy. This program was popularly known as Petty model,[4] which demonstrated a significant increase in exercise tolerance, reducing the rate of hospitalization and improvement in lung function to a certain extent at the end of 1 year of follow-up.

Following the popularity of Petty's model, pulmonary rehabilitation was first defined and described by the American College of Chest Physicians committee with the fundamentals of comprehensive therapy for disabled COPD patients in 1974.[6] Customized multidisciplinary rehabilitation with the focus on patient education, physical conditioning, and airway clearance technique was included in the recommendations.

In 1980, the components of pulmonary rehabilitation for patients with pulmonary disease were described by American Thoracic Society (ATS). These components included exercise training, patient education, outcome

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assessment, psychosocial care, and behavioral intervention. Among all, exercise training was regarded as one of the essential components of rehabilitation.

The early 1980s could be viewed as the period of Dark Ages for pulmonary rehabilitation as few doubted the benefits of exercise training in pulmonary rehabilitation. This thought was due to poor understanding of exercise physiology where the health-care professionals believed that exercise intolerance could not be corrected by exercise. A paper published by Belman and Kendregan[7] in 1981 failed to show improvement in heart rate and skeletal muscle enzyme following exercise training in patients with pulmonary disease, supporting the above belief. Dr. Haber, in a letter to editor, challenged the intensity of the intervention used in Bellman's research stating the low-intensity training could be the reason for no improvement.[8] Later, Bellman summarized in a review that exercise training aided improved exercise tolerance, upgraded mechanical skill, amplified motivation, and desensitized dyspnea.[9]

In 1991, Casaburi *et al*.[10] incorporated high-intensity exercise training in COPD patients, which showed lesser lactate accumulation posttraining. They claimed less lactate level reflected better exercise tolerance. This evidence was partially disagreed as research participants were of moderate disease severity. Subsequently, Casaburi *et al*.[11] reported similar adaptations to exercise training among patients of all grades of disease severity. Adding to this evidence pool, Maltais *et al*.[12] supported this evidence by a study which demonstrated a reduction in exercise-induced lactate following exercise training in 1996.

In 1994, a couple of research published emphasized the effects of pulmonary rehabilitation on dyspnea and quality of life. One among them was a paper published in Chest by Reardon *et al*.[13] demonstrating a reduction in dyspnea severity with outpatient rehabilitation program. The above article was probably the first randomized controlled trial in pulmonary rehabilitation. Another paper published in the lancet by Goldstein *et al*.[14] provided the proof of improvement in quality of life; however, no improvement was apparent in lung function following rehabilitation.

Frequent admission to hospital following acute exacerbation is a grueling problem in patients with respiratory disease. In 2000, Griffiths *et al*. and Bourbeau *et al*.[15,16] demonstrated a reduction in the frequency of hospital admission following pulmonary rehabilitation in their research. These results were the most encouraging outcomes obtained from pulmonary rehabilitation as this reduction in hospital admission was directly related to the decrease in the health-care costs. In the subsequent year, Porszasz *et al*.[17] discussed the mechanism in the reduction of dyspnea postexercise training (reduction of dynamic hyperinflation allowing the patient to exhale more with lesser respiratory rate).

International classification of impairment, disability, and handicap was in 1980 developed by the World Health Organization. This classification, however, was introduced for respiratory disease by ATS in its official statement in November 1998. In 2001, a global initiative for obstructive lung disease listed pulmonary rehabilitation as a standard and established treatment for COPD. In 2003, pulmonary rehabilitation was included in the algorithm for the management of stable COPD. This inclusion was a major milestone achievement in the journey of pulmonary rehabilitation.[18]

Eventually, patients with other chronic respiratory diseases were also considered for pulmonary rehabilitation. The ATS revised the guidelines for the pulmonary rehabilitation in 2013[19] which discussed poor adherence to the program and strategies to improve long-term adherence to these health-enhancing behaviors.

In the authors' view point, concept of pulmonary rehabilitation in South India started picking up in 1990, but practice of pulmonary rehabilitation began early in 21th century. However, even today, accessibility to pulmonary rehabilitation center is a major challenge. Awareness of pulmonary rehabilitation needs to be instilled among health-care professionals including community health workers for ease of access and effectiveness of the program.

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Conflicts of interest
There are no conflicts of interest.

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