

A commentary on rehabilitation effect of Liuzijue in water on patients with chronic obstructive pulmonary disease in stable period

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In recent years, pulmonary rehabilitation of chronic obstructive pulmonary disease (COPD) has attracted more and more attention from scholars at home and abroad. Among them, exercise training (such as power bicycle, auxiliary ventilator and taijiquan exercise, etc.), which is the core of pulmonary rehabilitation therapy, is one of the most effective rehabilitation treatment methods for this disease. It not only reduces breathing difficulties and improves exercise endurance, but also improves health-related quality of life [1-4].

However, the majority of COPD patients undergoing pulmonary rehabilitation is generally older and may suffer from complications of limited exercise training such as skeletal muscle dysfunction, osteoarthritis, and obesity. In fact, A growing number of recent studies have found that among the patients with exercise restriction COPD, some patients do not have severe impairment of lung function, but show obvious skeletal muscle dysfunction, with reduced muscle strength, decreased muscle endurance and skeletal muscle fatigue [5,6]. For COPD patients with limited exercise function, if conventional exercise training method is still adopted, the rehabilitation exercise effect will not only be reduced due to the difficulty in completing the exercise training plan, but also have an adverse impact on the complications of these COPD patients.

Water exercise therapy refers to the use of water buoyancy for walking training, balance training and range of motion training, or the use of water resistance for strength training and endurance training methods. For COPD patients with limited exercise function, compared with ground exercise training, water exercise therapy not only overcomes the adverse effects of complications of patients due to the drop of gravity on the body, but also helps COPD patients to carry out breathing training in water and improve the endurance of respiratory muscles due to the pressure of water on the chest and abdomen. In recent years, some scholars have carried out this research. Perk [7] et al. found that water exercise training can effectively improve the exercise function of patients with severe COPD. Waddell [8] et al. found that water exercise training can significantly improve exercise endurance and quality of life of COPD patients. Mchamra [9] et al. found that patients with COPD with limited and unrestricted exercise could benefit from water exercise therapy.

Liuzijue is a traditional Chinese exercise method that combines breathing with pronunciation and body movements. It has a long history, is widely spread, and has a good mass basis. The earliest extant documents can be found in the records of *Nourishing the Nature and Keeping the Life* written by Tao Hongjing in the southern and northern dynasties. After Tao Hongjing, there were many records about Liuzijue in the past dynasties, which developed and supplemented his functions

and methods. In recent years, it has attracted more and more attention as a traditional rehabilitation and exercise method that can effectively prevent the further development of COPD. Related studies at home and abroad have proved that it has significant significance in improving the exercise ability and symptom control of COPD patients [10]. My previous study also confirmed that Liuzijue has a significant effect on the improvement of COPD patients' exercise ability, quality of life score, number of acute attacks, and other aspects. However, the mechanism of Liuzijue is still unclear and only tentative research has been done. It is thought to be linked to two things. One is to improve respiratory muscle strength through slow, long breathing with articulation and gentle body movements, and the other is to reduce inflammation throughout the body through appropriate exercise intensity.

Therefore, this project will explore the effect of the new exercise training method of Liuzijue in water on the rehabilitation of COPD patients on the basis of the previous intervention study of Liuzijue on COPD patients.

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