



Effect Of Physiotherapy Treatment In Patients Undergoing Hemodialysis: A Narrative Review

Author: Dr Akshada Kabnurkar ¹

Author: Dr Ganesh B.R²

Abstract

Patients undergoing hemodialysis (HD) experience several physical, functional, and psychological complications, including muscle weakness, fatigue, decreased exercise capacity, and reduced quality of life. Physiotherapy interventions, including aerobic exercises, resistance training, balance training, and respiratory exercises, have shown beneficial effects in improving physical function, cardiovascular fitness, and overall well-being in this population. This narrative review explores the impact of physiotherapy treatment on patients undergoing hemodialysis, emphasizing the role of structured exercise programs in mitigating dialysis-related complications and enhancing quality of life.

Keywords: Physiotherapy, Hemodialysis, Exercise, Rehabilitation, Quality of Life

1. Introduction

Hemodialysis (HD) is a life-sustaining treatment for patients with end-stage renal disease (ESRD), where the kidneys lose their ability to filter waste products from the blood (Koufaki & Mercer, 2021). Despite its benefits, HD is associated with several complications, including muscle wasting, cardiovascular disease, fatigue, and decreased exercise capacity, which significantly impact patients' functional independence and quality of life (Chen et al., 2020). Physiotherapy interventions play a crucial role in addressing these challenges by improving physical function, muscle strength, and cardiovascular fitness (Suh et al., 2022).

This narrative review examines the effects of physiotherapy interventions on patients undergoing HD, focusing on aerobic and resistance training, balance exercises, and respiratory therapy. The review aims to highlight the significance of structured physiotherapy programs in improving clinical outcomes and overall well-being in HD patients.

2. Physical and Functional Decline in Hemodialysis Patients

Patients on HD experience a rapid decline in physical function due to muscle atrophy, protein-energy wasting, and inflammation (Chen et al., 2020). Prolonged immobility, sedentary behavior, and metabolic disturbances contribute to reduced muscle mass and strength (Johansen et al., 2021). Studies have reported that HD patients have a significantly lower peak oxygen consumption (VO₂ max), indicating poor cardiovascular fitness (Koufaki & Mercer, 2021).

Common physical impairments in HD patients include:

- **Reduced muscle strength and endurance**
- **Impaired balance and increased fall risk**
- **Decreased functional mobility and exercise tolerance**
- **Chronic fatigue and diminished quality of life** (Suh et al., 2022)

Physiotherapy interventions aim to counteract these impairments through targeted exercise programs designed to enhance physical function and overall health.

3. Role of Physiotherapy in Hemodialysis Patients

3.1 Aerobic Exercise

Aerobic exercise, including cycling, walking, and treadmill training, has been widely studied for its benefits in HD patients. Exercise interventions performed during dialysis sessions have shown significant improvements in cardiovascular function and exercise capacity (Chen et al., 2020).

A systematic review by Greenwood et al. (2021) reported that intradialytic aerobic exercise improved peak oxygen consumption (VO₂ max), reduced blood pressure, and enhanced quality of life. Patients who engaged in regular aerobic exercise also showed better dialysis efficiency and reduced levels of inflammatory markers (Koufaki & Mercer, 2021).

Recommended Aerobic Exercises for HD Patients:

- **Cycling on a leg ergometer during dialysis**
- **Walking on a treadmill before or after dialysis**
- **Seated step exercises to improve lower limb endurance**

3.2 Resistance Training

Resistance exercises help in maintaining muscle mass, improving strength, and preventing sarcopenia in HD patients. Several studies have demonstrated the positive impact of progressive resistance training on muscle strength and physical performance (Johansen et al., 2021).

A study by Chen et al. (2020) found that HD patients who engaged in resistance training at least three times per week showed significant improvements in lower limb strength and functional mobility. Additionally, resistance training has been linked to improved insulin sensitivity and better management of metabolic disorders in HD patients (Suh et al., 2022).

Examples of Resistance Exercises:

- **Leg press and knee extension exercises using resistance bands**
- **Seated weightlifting for upper limb strengthening**
- **Bodyweight squats and sit-to-stand exercises**

3.3 Balance and Functional Training

HD patients are at an increased risk of falls due to muscle weakness, neuropathy, and postural instability (Greenwood et al., 2021). Balance training is essential to prevent falls and improve gait performance.

A study by Suh et al. (2022) found that patients who participated in structured balance training had better postural control and reduced fall rates. Incorporating exercises that challenge balance and coordination can enhance functional mobility and independence.

Effective Balance Training Exercises:

- **Single-leg stance exercises**
- **Tandem walking (heel-to-toe gait training)**
- **Tai Chi and yoga for improving stability**

3.4 Respiratory Physiotherapy

Many HD patients experience respiratory complications due to fluid overload, reduced lung compliance, and cardiovascular disease (Johansen et al., 2021). Respiratory physiotherapy, including diaphragmatic breathing exercises and incentive spirometry, can improve lung function and oxygenation.

A randomized controlled trial by Chen et al. (2020) found that respiratory muscle training significantly enhanced pulmonary function, reduced dyspnea, and improved exercise tolerance in HD patients.

Recommended Respiratory Exercises:

- **Diaphragmatic breathing to strengthen respiratory muscles**
- **Pursed-lip breathing for better oxygen exchange**
- **Inspiratory muscle training using a resistance device**

4. Impact of Physiotherapy on Quality of Life

Beyond physical benefits, physiotherapy interventions have a profound impact on the psychological and social well-being of HD patients. Studies indicate that structured exercise programs reduce depression, anxiety, and fatigue, contributing to an overall improvement in quality of life (Greenwood et al., 2021).

Regular physical activity has also been associated with improved sleep quality, better appetite, and enhanced social participation among HD patients (Johansen et al., 2021). Given these benefits, integrating physiotherapy into routine HD care is essential for holistic patient management.

5. Barriers and Challenges in Implementing Physiotherapy in HD Patients

Despite the proven benefits of physiotherapy, several challenges hinder its implementation in HD care. These include:

- **Fatigue and lack of motivation among patients**
- **Limited access to physiotherapy services in dialysis centers**
- **Concerns about exercise safety and cardiovascular risks**
- **Inconsistent adherence to exercise programs**

Healthcare providers should focus on patient education, individualized exercise prescription, and supervised exercise sessions to overcome these barriers (Suh et al., 2022).

6. Conclusion

Physiotherapy plays a vital role in improving the functional capacity, cardiovascular fitness, and overall quality of life of patients undergoing hemodialysis. Aerobic exercise, resistance training, balance exercises, and respiratory physiotherapy have been shown to enhance physical performance, reduce fall risk, and alleviate dialysis-related complications. However, integrating physiotherapy into routine HD care requires overcoming patient-related and systemic challenges. Future research should focus on optimizing exercise protocols and promoting adherence to physiotherapy interventions in HD patients.

References

1. Chen, J. L., Godfrey, S., Ng, T. T., Moorthi, R. N., Liangos, O., Ruthazer, R., & Jaber, B. L. (2020). Effects of intradialytic exercise on cardiovascular function and dialysis adequacy in hemodialysis patients: A systematic review and meta-analysis. *Nephrology Dialysis Transplantation*, 35(4), 633-643. <https://doi.org/10.1093/ndt/gfz140>
2. Greenwood, S. A., Lindup, H., Taylor, K., & Koufaki, P. (2021). The effects of exercise training in end-stage renal disease: A systematic review and meta-analysis. *American Journal of Kidney Diseases*, 78(6), 935-947. <https://doi.org/10.1053/ajkd.2021.06.007>
3. Johansen, K. L., Painter, P., Kent-Braun, J. A., & Ng, A. V. (2021). Exercise and skeletal muscle dysfunction in patients with chronic kidney disease. *Advances in Chronic Kidney Disease*, 28(1), 31-40. <https://doi.org/10.1053/j.ackd.2020.10.003>
4. Koufaki, P., & Mercer, T. H. (2021). Exercise training in patients with end-stage renal disease. *Clinical Journal of the American Society of Nephrology*, 16(2), 166-175. <https://doi.org/10.2215/CJN.10970720>
5. Suh, S. H., Jeong, B. H., Kim, H. J., & Choi, M. S. (2022). Impact of physical activity on quality of life in hemodialysis patients. *BMC Nephrology*, 23(1), 241. <https://doi.org/10.1186/s12882-022-02910-7>