

Rehabilitation Through Physiotherapy in a Patient with Chronic Kidney Disease Receiving Maintenance Hemodialysis: A Case Report

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Abstract:

➤ *Background:*

Chronic kidney disease (CKD) is a progressive condition associated with reduced kidney function, fatigue, decreased exercise tolerance, impaired quality of life, and multiple comorbidities. Patients undergoing maintenance hemodialysis frequently experience physical deconditioning and functional limitations. Exercise-based physiotherapy interventions have been increasingly recommended as an adjunctive treatment to improve overall health outcomes in this population.

➤ *Case Presentation:*

A 56-year-old male field worker with a history of bilateral renal calculi surgery, longstanding hypertension, major polytrauma with multiple fractures, and poor hydration habits presented with breathlessness, vomiting, severe fatigue, and progressive decline in kidney function. Laboratory investigations revealed hemoglobin of 6 g/dL and serum creatinine of 13 mg/dL, leading to the diagnosis of end-stage kidney disease requiring hemodialysis. Initially, dialysis was performed through a central venous catheter, followed by creation of a left upper-limb arteriovenous fistula for maintenance hemodialysis twice weekly. Persistent fatigue and reduced quality of life prompted referral for physiotherapy.

➤ *Intervention:*

An eight-week physiotherapy program consisting of diaphragmatic breathing exercises, upper- and lower-limb stretching exercises, and low-intensity mobility exercises was performed four days per week on non-dialysis days, with morning and evening sessions. Exercise intensity was modified according to fatigue levels.

➤ *Outcome Measures:*

Fatigue Assessment Scale (FAS) and Kidney Disease Quality of Life (KDQOL) questionnaire were assessed before and after intervention.

➤ *Results:*

Following eight weeks of supervised physiotherapy, the patient demonstrated reduced fatigue scores and improved quality of life, with better tolerance to activities of daily living and reduced perception of exhaustion.

➤ **Conclusion:**

An individualized physiotherapy program performed on non-dialysis days may improve fatigue and quality of life in patients with CKD undergoing maintenance hemodialysis. Early incorporation of physiotherapy should be considered as part of multidisciplinary renal rehabilitation.

Keywords: Chronic Kidney Disease, Hemodialysis, Physiotherapy, Fatigue, Quality of Life, Renal Rehabilitation, Case Report.

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I. INTRODUCTION

Chronic kidney disease (CKD) is a progressive and irreversible loss of renal function characterized by structural or functional abnormalities of the kidneys lasting for more than three months. (1) Advanced stages of CKD can progress to end-stage kidney disease (ESKD), requiring renal replacement therapy in the form of hemodialysis, peritoneal dialysis, or kidney transplantation. Hemodialysis remains one of the most commonly utilized treatment modalities worldwide for sustaining life in patients with severe renal failure.(2)

Despite improving survival, hemodialysis is associated with numerous complications, including fatigue, muscle weakness, reduced exercise capacity, impaired quality of life, depression, sleep disturbances, and decreased participation in activities of daily living.(3) Fatigue is among the most frequently reported symptoms in dialysis patients and often persists even after adequate dialysis sessions. Reduced physical activity further contributes to muscle wasting, functional decline, and poor overall health outcomes.(4)

Physiotherapy interventions including breathing exercises, stretching, aerobic training, and strengthening exercises have demonstrated beneficial effects in improving functional capacity, reducing fatigue, and enhancing quality of life in patients undergoing maintenance hemodialysis. Exercise performed on non-dialysis days can provide additional opportunities for rehabilitation while minimizing treatment-related exhaustion.(5)

This case report describes the clinical presentation, medical history, and outcomes following an eight-week physiotherapy exercise program in a patient with CKD undergoing maintenance hemodialysis.

II. CASE PRESENTATION

A 56-year-old male field worker presented with complaints of severe fatigue, breathlessness, generalized weakness, vomiting, and reduced tolerance to physical activities. The patient was eventually diagnosed with chronic kidney disease requiring maintenance hemodialysis.

The patient had a significant medical history. At the age of 48 years, he underwent laparoscopic surgery for bilateral renal calculi. According to the surgical records, the stone sizes were approximately 6 cm, 2 cm, and 0.5 cm involving both kidneys. Following the renal stone surgery, he developed hypertension and had been receiving regular antihypertensive treatment since then.

The patient worked as a field laborer with prolonged exposure to sunlight. He reported a chronic history of poor hydration despite his physically demanding occupation. His average daily water intake was approximately one litre. He frequently consumed tea and coffee instead of water and reported drinking at least six cups of tea daily. He denied smoking and alcohol consumption. At the age of 52 years, the patient met with a major road traffic accident that resulted in multiple fractures and severe facial injuries. He underwent oromaxillofacial surgery and remained hospitalized for approximately two months and twenty-two days. Following rehabilitation and recovery, he gradually returned to his routine activities.

Approximately four years after the accident, the patient developed progressive fatigue, breathlessness, recurrent vomiting, and declining physical endurance. Medical evaluation revealed severe anemia with a hemoglobin level of 6 g/dL and markedly elevated serum creatinine of 13 mg/dL. Further investigations confirmed severe kidney failure.

The patient was admitted for further management and underwent emergency hemodialysis through a neck central venous catheter. Subsequently, a left upper-limb arteriovenous fistula was surgically created to facilitate long-term hemodialysis access. Following initiation of dialysis, his serum creatinine reduced to 8 mg/dL; however, due to progressive deterioration of renal function and intermittent reduction in urine output, maintenance hemodialysis twice weekly was continued.

During dialysis treatment, the patient frequently experienced severe fatigue and generalized weakness. He also reported episodes of reduced calcium levels requiring medical management. Owing to persistent physical deconditioning and fatigue, the patient was referred for physiotherapy rehabilitation.

III. CLINICAL FINDINGS

Table 1 Demographic Details

Variable	Findings
Age	56 years
Sex	Male
Occupation	Field worker
Smoking history	No
Alcohol history	No
Comorbidities	Hypertension
Dialysis frequency	Twice weekly
Dialysis access	Left upper-limb AV fistula
Duration of dialysis	Maintenance hemodialysis

Table 2 Laboratory Findings at Diagnosis

Parameter	Value
Hemoglobin	6 g/dL
Serum Creatinine	13 mg/dL
Post-dialysis Creatinine	8 mg/dL

Table 3 Timeline of Events

Year/Age	Event
Age 48	Bilateral renal stone removal through laparoscopic surgery
After surgery	Diagnosed with hypertension and started regular medication
Age 52	Major accident with multiple fractures and oromaxillofacial surgery
2 months 22 days	Hospitalization following trauma
Four years later	Developed fatigue, vomiting, breathlessness
Hospital evaluation	Hemoglobin 6 g/dL, creatinine 13 mg/dL
Diagnosis	Kidney failure requiring hemodialysis
Initial management	Central venous catheter dialysis
Later	Left AV fistula creation
Maintenance phase	Hemodialysis twice weekly
Rehabilitation	Eight-week physiotherapy program

➤ *Physiotherapy Assessment*

The patient complained of:

- Severe fatigue following dialysis sessions.
- Breathlessness during activities.
- Reduced exercise tolerance.
- Generalized muscle stiffness.

- Difficulty performing prolonged physical work.
- Reduced quality of life.

• *Outcome measures selected were:*

- ✓ Fatigue Assessment Scale (FAS).
- ✓ Kidney Disease Quality of Life Questionnaire (KDQOL).

• *Physiotherapy Intervention*

The patient underwent physiotherapy for eight weeks on non-dialysis days.

• *Frequency*

- ✓ Four days per week.
- ✓ Morning session and evening session.
- ✓ Exercises were omitted or modified if the patient experienced excessive fatigue.

➤ *Exercise Program*

• *Diaphragmatic Breathing Exercises*

- ✓ Relaxed supine or sitting position.
- ✓ Slow deep inhalation through the nose.
- ✓ Controlled exhalation through pursed lips.
- ✓ 10 repetitions × 3 sets.

• *Upper Limb Stretching*

- ✓ Shoulder flexor stretches.
- ✓ Shoulder abductor stretches.
- ✓ Wrist and forearm stretches.
- ✓ Neck mobility exercises.

• *Lower Limb Stretching*

- ✓ Hamstring stretching.
- ✓ Quadriceps stretching.
- ✓ Calf stretching.
- ✓ Hip flexor stretching.

• *Active Range of Motion Exercises*

- ✓ Shoulder movements.
- ✓ Elbow flexion-extension.
- ✓ Hip flexion-extension.
- ✓ Knee flexion-extension.
- ✓ Ankle pumps.

• *Walking and Functional Mobility*

- ✓ Gentle walking as tolerated.
- ✓ Activity pacing and energy conservation education.

Exercise intensity was maintained at a low-to-moderate level and monitored according to patient tolerance.

➤ *Outcome Measures*

Table 4. Outcome Measure Scores

Outcome Measure	Pre-Intervention	Post-Intervention
Fatigue Assessment Scale (FAS)	39	28
KDQOL Score	48	68

The patient demonstrated clinically meaningful reductions in fatigue and improvements in quality of life following the eight-week physiotherapy program.

➤ *Ethical Considerations*

This single case study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (2013) for research involving human participants. Prior to participation, the patient was provided with detailed information regarding the purpose of the study, the proposed physiotherapy intervention, potential risks and anticipated benefits, and the right to withdraw from the study at any time without affecting ongoing medical care. Written informed consent was obtained from the patient for participation and publication of anonymized clinical information and images. A risk-benefit assessment was performed before initiating the intervention, and the expected therapeutic benefits were considered to outweigh the minimal risks associated with supervised physiotherapy. Throughout the study, patient safety, privacy, confidentiality, and well-being were prioritized, and the exercise program was continuously monitored and modified according to the patient's clinical condition and tolerance to minimize any adverse events

IV. RESULTS

After eight weeks of regular physiotherapy, the patient reported reduced breathlessness during routine activities and improved overall physical endurance. Fatigue severity decreased considerably, allowing better participation in daily activities. He also reported improved sleep quality, reduced perception of exhaustion after dialysis sessions, and enhanced confidence in performing self-care activities. The quality-of-life assessment demonstrated notable improvement compared with baseline findings.

No adverse events or dialysis-related complications occurred during the physiotherapy intervention period.

V. DISCUSSION

This case report highlights the potential benefits of physiotherapy in patients undergoing maintenance hemodialysis. The patient had multiple risk factors that may have contributed to the development and progression of kidney disease, including previous renal calculi, longstanding hypertension, chronic inadequate hydration, physically

demanding outdoor work, and severe systemic stress following major trauma.

Fatigue is highly prevalent among individuals receiving hemodialysis and often results from anemia, uremia, muscle wasting, reduced physical activity, inflammation, and dialysis-related physiological changes. (6)The patient's severe anemia at diagnosis and persistent fatigue after dialysis are consistent with symptoms commonly observed in advanced CKD.(7)

Breathing exercises may improve ventilatory efficiency and reduce dyspnea perception, while stretching exercises help maintain flexibility, improve circulation, and reduce musculoskeletal discomfort.(8) Regular physical activity can also mitigate deconditioning and improve physical functioning. Conducting exercise sessions on non-dialysis days may allow better participation by minimizing post-dialysis fatigue.(9)

The reduction in fatigue scores and improvement in quality-of-life outcomes observed in this patient suggest that individualized physiotherapy programs may serve as an effective adjunctive treatment in renal rehabilitation. (10) Similar findings have been reported in previous studies demonstrating improved functional capacity, reduced fatigue, and enhanced quality of life following structured exercise programs in hemodialysis populations.(11)

VI. CONCLUSION

This case report demonstrates that an eight-week physiotherapy program consisting of diaphragmatic breathing exercises, stretching exercises, and low-intensity mobility training performed on non-dialysis days improved fatigue and quality of life in a patient with chronic kidney disease undergoing maintenance hemodialysis. Physiotherapy appears to be a safe, feasible, and beneficial adjunct intervention in renal rehabilitation and should be considered as part of comprehensive multidisciplinary management.

➤ *Clinical Implications*

- Physiotherapy can be safely implemented in hemodialysis patients.
- Exercise on non-dialysis days may improve adherence.
- Fatigue and quality of life should be routinely assessed in CKD patients.
- Early rehabilitation may help reduce functional decline and improve overall well-being.

➤ *Patient Perspective*

The patient reported feeling less tired after completing the exercise program and stated that breathing became easier during daily activities. He also expressed greater confidence in performing routine tasks and believed that regular physiotherapy helped improve his overall quality of life.

➤ *Limitation of the Study*

This case report has several limitations. As it involved a single patient, the findings cannot be generalized to the wider CKD population. The patient experienced intermittent fatigue during exercise sessions, necessitating rest periods and occasional modifications to the prescribed exercise intensity. In addition, post-dialysis tiredness resulted in variable cooperation and participation, which may have influenced treatment adherence and outcomes. The absence of a control group and the limited follow-up period further restrict the interpretation of the intervention's long-term effectiveness. Future studies involving larger sample sizes and longer follow-up durations are warranted to validate these findings.

➤ *Conflicts of Interest*

The authors declare no conflict of interest.

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