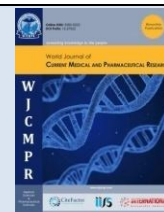




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AN EVALUATIVE STUDY TO ASSESS THE EFFECTIVENESS OF INTRADIALYTIC LEG EXERCISES TO REDUCE THE FATIGUE AND IMPROVE THE ACTIVITIES OF DAILY LIVING AMONG HEMODIALYSIS PATIENTS IN SELECTED HOSPITALS KANPUR, UTTAR PRADESH

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ARTICLE HISTORY	ABSTRACT
Received on: 14-08-2026 Revised on: 24-09-2026 Accepted on: 11-10-2026 Keywords: Intradialytic leg exercises, Hemodialysis, Fatigue, Activities of daily living (ADL), Quasi-experimental study, Chronic kidney disease (CKD). Corresponding Author Dr. K Jyothisree	A quasi-experimental study to assess the effectiveness of intradialytic leg exercise to reduce the fatigue and improve the activities of daily living among hemodialysis patients in selected hospitals in Kanpur, UP. A total 60 sample were collected, and these 60 samples were divided between control group and the experimental group. 30 were taken for the control group, and the remaining 30 were taken for the experimental group, the data collected and analyzed and descriptive on inferential statistics. The current study findings revealed that among hemodialysis patients in the pre-test, in the experimental group, the highest majority, 18 (60%), had severe fatigue. Similarly, in the control group, highest majority 15 (50%) had moderate fatigue. Regarding activities of daily living, in the experimental group, the highest majority, 20 (66.67%), were partially dependent. In the control group, the highest majority, 12 (40%), was partially dependent. The present study findings revealed that in post-test, in the experimental group, the highest majority, 19 (63.33%), had mild fatigue. Where in control group highest majority 18 (60%) had mild fatigue. Similarly, activities of daily living improved the in the experimental group, where 20 (66.67) became independent, while in the control group most of the patients highest majority 18 (60%) remained partially dependent. The calculated T value for the experimental group was 5.80 Which is greater than the table value 6.699 at the 0.05 level of significance ($p < 0.05$). In the control group, the calculated t-value was 1.66 which is less than the table value 6.69, indicating a non-significant difference. The study findings revealed that in the experimental group, the research hypothesis (H₁) was accepted and the null hypothesis (H₀) was rejected, indicating the effectiveness of intradialytic leg exercises in reducing fatigue and improving activities of daily living. In contrast, in the control group, the null hypothesis (H₀) was accepted and the research hypothesis (H₁) was rejected, indicating no significant change without intervention.

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INTRODUCTION

According to the Centers for Disease Control and Prevention (CDC), approximately one in three people with diabetes has chronic kidney disease (CKD). People with diabetes often have high blood glucose levels, which can damage various organs and body systems over time, including the kidneys.

The kidneys play a vital role in maintaining fluid balance, regulating blood pressure and fluid volume, producing red blood cells, and maintaining strong, healthy bones. They also help maintain appropriate salt and acid levels in the

blood while removing waste products and harmful substances from the circulation.

Hemodialysis is commonly administered to patients with advanced kidney disease or kidney failure. Kidney failure can occur for several reasons. Although the kidneys may continue to produce urine, their ability to filter waste products and excess fluid can progressively decline and may eventually cease to function adequately. Without appropriate treatment, waste products and toxins accumulate in the blood and can damage various organs and body systems. Severe kidney failure may lead to life-

threatening complications, including loss of consciousness, coma, and cardiac arrest.

Hemodialysis helps remove waste products, excess salts, and excess fluid from the blood, thereby supporting the patient's survival. It may also be used to remove certain medications or toxic substances from the body in cases of overdose, depending on the substance involved.

Acute kidney injury may be reversible with appropriate treatment, whereas chronic kidney disease is generally progressive and may require long-term renal replacement therapy.

Fatigue is a common problem among patients undergoing hemodialysis. One non-pharmacological intervention that may help reduce fatigue is **intradialytic leg exercise**, which includes ankle rotations, ankle dorsiflexion and plantar flexion, heel-dig exercises, and straight-leg-raising exercises. These exercises can be taught through simple, step-by-step instructions and performed during hemodialysis under appropriate supervision.

Nurses play an essential role in assessing and monitoring patients' fatigue levels and providing appropriate interventions to maintain or improve physical functioning, quality of life, and independence in activities of daily living (ADLs). Therefore, intradialytic leg exercises may be a useful nursing intervention for reducing fatigue and improving functional ability among patients undergoing hemodialysis [1].

NEED FOR THE STUDY

Chronic kidney disease (CKD) is a progressive condition that can lead to irreversible loss of kidney function and has become a significant global public health concern. The increasing burden of CKD has been associated with an ageing population, sedentary lifestyles, diabetes mellitus, and hypertension.

When CKD progresses to end-stage renal disease (ESRD), patients may require long-term renal replacement therapy, most commonly hemodialysis. This treatment can impose a considerable physical, psychological, and economic burden on patients, their families, and the healthcare system.

The prevalence of CKD in India is a major public health concern. According to the Global Burden of Disease (GBD) 2023 estimates, approximately 138 million individuals in India are living with CKD, accounting for nearly 16–17% of the adult population. India ranks second globally in terms of the total number of CKD cases [2].

The annual incidence of ESRD in India is estimated to be approximately 150–200 cases per million population. A considerable proportion of these patients depend on maintenance hemodialysis for survival [3].

At the regional level, Kanpur, Uttar Pradesh, has been identified as an area of concern for CKD. According to the Screening and Early Evaluation of Kidney Disease (SEEK-India) study, the reported prevalence of CKD in the studied population was 41.7%, which is substantially higher than commonly reported national estimates [4].

Patients undergoing hemodialysis frequently experience fatigue, muscle weakness, and limitations in performing activities of daily living. These problems may adversely affect their functional capacity, independence, and overall quality of life. Therefore, effective and accessible interventions are needed to address these challenges.

Intradialytic leg exercise is a simple, potentially low-cost, non-pharmacological intervention that can be performed

during hemodialysis under appropriate supervision. Evidence suggests that such exercises may improve muscle strength, reduce fatigue, and enhance functional capacity. (5)

Therefore, the present study aims to evaluate the effectiveness of intradialytic leg exercises in reducing fatigue and improving activities of daily living among patients undergoing hemodialysis in selected hospitals in Kanpur, Uttar Pradesh.

PROBLEM STATEMENT

“An Evaluative Study to Assess the Effectiveness of Intradialytic Leg Exercises in Reducing Fatigue and Improving Activities of Daily Living Among Hemodialysis Patients in Selected Hospitals in Kanpur, Uttar Pradesh.”

OBJECTIVES

1. To assess the pre-test levels of fatigue and activities of daily living among patients undergoing hemodialysis.
2. To evaluate the effectiveness of intradialytic leg exercises in reducing fatigue and improving activities of daily living among patients undergoing hemodialysis.
3. To determine the association between the pre-test scores for fatigue and activities of daily living and selected sociodemographic variables among patients undergoing hemodialysis.

HYPOTHESES

The hypotheses will be tested at a significance level of 0.05.

A hypothesis is a statement of the researcher's expectation regarding the relationship between variables.

Null hypotheses

- **H₀₁:** There is no significant difference between the pre-test and post-test fatigue scores and activities of daily living (ADL) scores among patients undergoing hemodialysis following the implementation of intradialytic leg exercises.
- **H₀₂:** There is no significant association between the pre-test fatigue scores and ADL scores and the selected sociodemographic variables among patients undergoing hemodialysis.

Research hypotheses

- **H₁:** There is a significant reduction in fatigue scores and a significant improvement in ADL scores among patients undergoing hemodialysis following the implementation of intradialytic leg exercises.
- **H₂:** There is a significant association between the pre-test fatigue scores and ADL scores and the selected sociodemographic variables among patients undergoing hemodialysis.

Note: H₀₂ and H₂ should be reviewed to ensure that the intended association is clearly specified. If the objective is to examine the association of fatigue and ADL scores separately with sociodemographic variables, the hypotheses should state this explicitly.

METHODS AND MATERIALS

Research Approach

A quantitative research approach was used in the present study.

Research Design

A quasi-experimental pre-test–post-test research design was used in the present study.

Variables

Independent Variable

The independent variable in the present study was intradialytic leg exercise among patients undergoing hemodialysis.

Dependent Variables

The dependent variables were fatigue and activities of daily living among patients undergoing hemodialysis.

Sociodemographic Variables

The sociodemographic variables included age, gender, educational status, occupation, monthly family income, marital status, area of residence, duration of hemodialysis treatment, frequency of hemodialysis per week, and the presence of comorbid illnesses.

Population

The population for the present study consisted of patients undergoing hemodialysis.

Target Population

The target population comprised patients undergoing hemodialysis in selected hospitals in Kanpur, Uttar Pradesh.

Accessible Population

The accessible population consisted of patients undergoing hemodialysis at Rama Hospital, Chandni Hospital, and Ursula Hospital in Kanpur, Uttar Pradesh.

Sample

The sample consisted of patients undergoing hemodialysis at Rama Hospital, Chandni Hospital, and Ursula Hospital in Kanpur who met the inclusion criteria.

Sample Size

The sample size for the present study was 60 patients undergoing hemodialysis.

Sampling Technique

A non-probability purposive sampling technique was used to select the participants.

Inclusion Criteria

The study included patients who:

- Were available at the time of data collection.
- Were undergoing hemodialysis.
- Experienced fatigue during hemodialysis sessions.
- Were physically able to perform intradialytic leg exercises.
- Were willing to participate in the study.

Exclusion Criteria

- The study excluded patients who:
- Were unavailable at the time of data collection.
- Had severe leg or muscular problems that prevented them from performing the prescribed exercises.

Method of Data Collection

A self-structured questionnaire and rating scales were used to assess the effectiveness of intradialytic leg exercises in reducing fatigue and improving activities of daily living among patients undergoing hemodialysis in selected hospitals in Kanpur, Uttar Pradesh.

Description of the Tool and Data Collection Technique

A structured data collection tool was used to assess the effectiveness of intradialytic leg exercises in reducing fatigue and improving activities of daily living among patients undergoing hemodialysis.

The tool consisted of the following sections:

Section A: Sociodemographic variables.

Section B: Fatigue Assessment Scale.

Section C: Activities of Daily Living (ADL) assessment.

RESULTS AND FINDINGS

Section A: Frequency- and Percentage-Wise Distribution of Sociodemographic Variables

The major findings of the study were as follows:

1. **Age:** In the experimental group, 12 (40%) participants were aged 31–45 years, and another 12 (40%) were aged 46–60 years. In the control group, 15 (50%) participants were aged 46–60 years.
2. **Gender:** The majority of participants in both the experimental and control groups were male, accounting for 18 (60%) participants in each group.
3. **Marital status:** The majority of participants were married, comprising 23 (76.67%) participants in the experimental group and 25 (83.33%) participants in the control group.
4. **Educational status:** In the experimental group, 10 (33.33%) participants had received primary education, whereas in the control group, 14 (46.67%) participants had received secondary education.
5. **Occupation:** In the experimental group, 15 (50%) participants were unemployed, compared with 13 (43.33%) participants in the control group.
6. **Monthly family income:** In the experimental group, 18 (60%) participants had a monthly family income of ₹20,000–₹30,000. In the control group, 10 (33.33%) participants had a monthly family income of ₹10,000–₹20,000.
7. **Area of residence:** In the experimental group, 16 (53.33%) participants resided in rural areas, compared with 18 (60%) participants in the control group.
8. **Duration of hemodialysis:** In the experimental group, 12 (40%) participants had been undergoing hemodialysis for less than six months, compared with 16 (53.33%) participants in the control group.
9. **Frequency of hemodialysis per week:** In the experimental group, 20 (66.67%) participants underwent hemodialysis three times per week, whereas in the control group, 19 (63.33%) participants underwent hemodialysis twice per week.
10. **Comorbid illnesses:** In the experimental group, 20 participants (66.67%, based on a group size of 30) had comorbid illnesses, compared with 21 (70%) participants in the control group.

SECTION D: Evaluation of the Effectiveness of Intradialytic Leg Exercises in Reducing Fatigue and Improving Activities of Daily Living Among Hemodialysis Patients in Selected Hospitals in Kanpur, Uttar Pradesh

Table 01: Comparison of Pre-Test and Post-Test Activities of Daily Living Scores Within the Experimental and Control Groups Using the Paired t-Test

Group and assessment	Mean	SD	Paired t-value	Table value	Inference
Experimental group (n = 30)					
Pre-test	18.23	5.91			
Post-test	26.47	8.17	4.41	1.699	Significant
Control group					

(n = 30)					
Pre-test	21.73	10.23			
Post-test	22.60	7.60	0.37	1.699	Not significant

Interpretation: The table shows that the mean ADL score in the experimental group increased from 18.23 (SD = 5.91) in the pre-test to 26.47 (SD = 8.17) in the post-test. The calculated paired t-value was 4.41, which was greater than the table value of 1.699, indicating a statistically significant improvement in ADL scores following the intervention.

In the control group, the mean ADL score increased slightly from 21.73 (SD = 10.23) in the pre-test to 22.60 (SD = 7.60) in the post-test. The calculated paired t-value was 0.37, which was lower than the table value of 1.699, indicating no statistically significant improvement.

These findings suggest that intradialytic leg exercises were associated with a significant improvement in activities of daily living among patients in the experimental group.

Table 02: Comparison of Pre-Test and Post-Test Fatigue Scores Within the Experimental and Control Groups Using the Paired t-Test

Group and assessment	Mean	SD	Paired t-value	Table value	Inference
Experimental group (n = 30)					
Pre-test	28.53	6.55			
Post-test	18.26	7.15	5.80	1.699	Significant
Control group (n = 30)					
Pre-test	23.30	6.45			
Post-test	20.73	5.55	1.66	1.699	Not significant

Interpretation: The table shows that the mean fatigue score in the experimental group decreased from 28.53 (SD = 6.55) in the pre-test to 18.26 (SD = 7.15) in the post-test. The calculated paired t-value was 5.80, which was greater than the table value of 1.699, indicating a statistically significant reduction in fatigue following the intervention.

In the control group, the mean fatigue score decreased from 23.30 (SD = 6.45) in the pre-test to 20.73 (SD = 5.55) in the post-test. The calculated paired t-value was 1.66, which was lower than the table value of 1.699, indicating that the reduction was not statistically significant at the specified significance level.

These findings suggest that intradialytic leg exercises were effective in reducing fatigue among patients in the experimental group.

Table 03: Comparison of Activities of Daily Living Scores between the Experimental and Control Groups Using the Independent t-Test

Group and assessment	Mean	SD	Independent t-value	Table value	Inference
Experimental group (n =					

30)					
Pre-test	18.23	5.91			
Post-test	26.47	8.17	4.48	2.00	Significant
Control group (n = 30)					
Pre-test	21.73	10.23			
Post-test	22.60	7.60	0.37	2.00	Not significant

Interpretation: The table shows that the mean ADL score in the experimental group increased from 18.23 (SD = 5.91) in the pre-test to 26.47 (SD = 8.17) in the post-test. The reported independent t-value was 4.48, which was greater than the table value of 2.00, indicating a statistically significant difference according to the reported calculation. In the control group, the mean ADL score increased from 21.73 (SD = 10.23) in the pre-test to 22.60 (SD = 7.60) in the post-test. The reported t-value was 0.37, which was lower than the table value of 2.00, indicating no statistically significant difference according to the reported calculation. The findings indicate that the experimental group demonstrated greater improvement in ADL scores after the intervention. However, the independent t-test values and the specific comparisons they represent should be verified before drawing a definitive conclusion about the difference between the groups.

Table 04: Comparison of Fatigue Scores Between the Experimental and Control Groups Using the Independent t-Test

Group and assessment	Mean	SD	Reported t-value	Table value	Inference
Experimental group (n = 30)					
Pre-test	28.53	6.55			
Post-test	18.26	7.15	5.80	2.00	Significant
Control group (n = 30)					
Pre-test	23.30	6.45			
Post-test	20.73	5.55	1.65	2.00	Not significant

Interpretation: The table shows that the mean fatigue score in the experimental group decreased from 28.53 (SD = 6.55) in the pre-test to 18.26 (SD = 7.15) in the post-test. The reported t-value was 5.80, which was greater than the table value of 2.00, indicating a statistically significant difference according to the reported calculation. In the control group, the mean fatigue score decreased from 23.30 (SD = 6.45) in the pre-test to 20.73 (SD = 5.55) in the post-test. The reported t-value was 1.65, which was lower than the table value of 2.00, indicating no statistically significant difference according to the reported calculation. Overall, the results suggest that fatigue decreased more substantially in the experimental group than in the control group. Nevertheless, the independent t-test results should

be recalculated using the appropriate between-group comparisons before the effectiveness of the intervention is confirmed statistically.

Section E: Association between Fatigue Scores and Activities Of Daily Living Scores And Selected Sociodemographic Variables

The results showed the association between the pre-test fatigue scores and ADL scores and the selected sociodemographic variables among patients undergoing hemodialysis.

The findings indicated that the association between these variables should be interpreted separately for the experimental and control groups, based on the statistical tests performed and the corresponding p-values.

In the experimental group, the research hypothesis was accepted and the null hypothesis was rejected for the associations found to be statistically significant. In contrast, in the control group, the null hypothesis was retained for the associations that were not statistically significant.

However, the acceptance or rejection of the hypotheses must be based on the actual statistical results for each sociodemographic variable. Without the association table, calculated test statistics, and p-values, it is not possible to confirm that these conclusions apply to all the variables examined.

CONCLUSION

The present study aimed to evaluate the effectiveness of intradialytic leg exercises in reducing fatigue and improving activities of daily living (ADLs) among patients undergoing hemodialysis in selected hospitals in Kanpur, Uttar Pradesh. Based on the findings of the study, the following conclusions were drawn.

During the pre-test assessment, patients undergoing hemodialysis experienced fatigue and limitations in performing activities of daily living. According to the reported findings, no participants were classified as having an adequate level of ADL performance or a low level of fatigue.

Following the intradialytic leg exercise intervention, the post-test results showed a reduction in fatigue scores and an improvement in ADL scores among patients in the experimental group. The mean ADL score increased from 18.23 in the pre-test to 26.47 in the post-test, while the mean fatigue score decreased from 28.53 to 18.26. The reported paired t-test results indicated statistically significant changes in both outcomes in the experimental group.

In comparison, the control group demonstrated only a small increase in the mean ADL score, from 21.73 to 22.60, and a decrease in the mean fatigue score, from 23.30 to 20.73. The reported paired t-test results indicated that these changes were not statistically significant.

These findings suggest that intradialytic leg exercises may be a useful non-pharmacological nursing intervention for reducing fatigue and improving activities of daily living among patients undergoing hemodialysis. Such exercises may help enhance patients' functional capacity, independence, and quality of life when performed appropriately under supervision.

Therefore, intradialytic leg exercises may be considered a supportive component of nursing care for patients undergoing hemodialysis, subject to individual assessment and clinical suitability.

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Not Declared

AUTHOR CONTRIBUTION

All Authors are Contributed Equally.

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