

	ORIGINAL RESEARCH PAPER A NARRATIVE REVIEW ON THE EFFECTIVENESS OF RESISTANCE EXERCISE ON MUSCLE CRAMPS AND QUALITY OF LIFE AMONG HAEMODIALYSIS PATIENTS	Nursing KEY WORDS: Resistance exercise, Haemodialysis, Muscle cramps, Quality of life, Haemodialysis adequacy, Muscle strengthening excercises.
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ABSTRACT	Muscle cramps are a common and distressing symptom in patients undergoing hemodialysis, often impairing treatment adherence and quality of life. This narrative review explores the effectiveness of resistance exercise as a non-pharmacological intervention for reducing muscle cramps and improving overall well-being in this population. Evidence from clinical and observational studies suggests that regular resistance training can enhance muscle strength, circulation, and reduce the frequency and severity of cramps. Additionally, improvements in physical functioning and psychological outcomes contribute to better health-related quality of life (HRQoL). However, variations in exercise protocols and limited long-term studies call for more robust, standardized research. Aim: Present study was aimed to assess the effectiveness of resistance exercises on muscle cramps and quality of life among haemodialysis patients. Methodology: The present study is a narrative review of effect on resistance exercise on URR and Kt/v among haemodialysis patients. Literature from 2019 to 2024 was searched using electronic database from PubMed, Google Scholar, ProQuest, SCOPUS Library and Research Gate. Electronic database search was done to extract the articles related to the theme of research problem and related terms using the keywords - ““Chronic Kidney Disease” OR “Muscle cramps” OR “ESRD” AND “quality of life” AND “Hemodialysis AND resistance exercises” AND “randomized controlled trial” “Muscle cramps” AND quality of life” OR “Intradialytic exercise” AND “ “aerobic exercise” OR “muscle strengthening exercise”.	
INTRODUCTION	Haemodialysis is a medical procedure used to treat patients with chronic kidney disease (CKD) or acute kidney failure by performing the function of the kidneys when they are no longer able to do so effectively. It involves filtering a patient's blood outside of the body using a dialysis machine, which removes waste products, excess fluids, and helps balance electrolytes like potassium, sodium, and bicarbonate. The kidneys are responsible for filtering waste and maintaining the balance of fluids and electrolytes in the body. When the kidneys fail, they can no longer perform these functions, leading to a buildup of waste products, toxins, and fluid in the body, which can be life-threatening. Haemodialysis provides a life-saving intervention by artificially performing the filtration and cleansing functions of the kidneys. Once patients have been diagnosed with End-stage renal disease (ESRD), most of them will require dialysis or renal transplant. ESRD increases morbidity, mortality, adds additional costs to healthcare system and there is no cure from ESRD. Thus, the key to improve long-term outcomes is in preventing progression of this disease (Bikbov et al., 2018). Hemodialysis (HD) is a serum treatment that involves the use of a dialysis machine and a specific filter referred as an artificial kidney or dialyzer. Throughout the treatment, patients may encounter problems such as hypotension, muscle cramps, disequilibrium disorder, and vomiting. Hypotension, infection, muscle spasms, skin irritation, and other complications might occur because of hemodialysis. Muscle cramps are one of the most common and frequent intradialytic complications. They are a painful experience described by Hemodialysis patients as rapid throbbing and	
	spontaneous tightening of the muscle. A study carried out by Abouelala et al (2021) showed that active and passive stretching exercises had a positive effect on reducing the intensity of muscle cramps among HD patients and they were safe and inexpensive procedure. Even more, Jayasrikannan et al (2021) in their study observed that, the intradialytic exercises were highly effective in reducing muscle cramps and improving the quality of life among Hemodialysis patients. Quality of life (QOL) is a multidisciplinary concept used to describe a set of variables including physical, psychological, social, and functional dimensions. CKD has a great impact on health related QoL from initial stage of disease to its end stage due to effect of symptoms, restrictions and its treatment on daily life of these patients. Haemodialysis (Global Incidence and Prevalence) Globally, haemodialysis is widely used as a life-saving treatment for patients with end-stage renal disease (ESRD). The incidence and prevalence of dialysis patients vary by country, with high-income nations typically having better infrastructure and higher numbers of dialysis patients. • The Global Dialysis Database (GDD). Of these, the vast majority are on haemodialysis. • According to National Kidney Foundation estimates, approximately 200,000-300,000 people in India undergo dialysis annually, with about 100,000 new patients starting dialysis each year. • The annual incidence rate of chronic kidney disease (CKD) in Delhi NCR is estimated to be about 200-250 new dialysis patients per million population annually. • Hypertensive nephropathy accounts for about 25-30% of all ESRD cases in both developed and developing	

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- countries.
- Diabetes is the primary cause of kidney disease in many countries, contributing to over 40% of all ESRD cases globally.

1. Resistance Exercise:-

It refers to a type of physical activity designed to improve muscle strength and endurance using resistance, and to improve the quality of Life. These exercises are particularly important for people on haemodialysis because they often experience muscle wasting, fatigue, and decreased physical function due to their illness and treatment.

In includes manual technique which involves 6min walking test, Sit to Stand Test, Timed up and go and Grip strength.

Sit to Stand	Number of "full stands from a seated position" (without using hands) completed in 30 s. May also be measured as the number of full stands from seated position in a fixed period of time
Timed up & Go	Time it takes for a seated subject to stand, walk a set distance
6min walk test	Total distance walked without assistance over a 6-min period
Grip strength	Subject maximally squeezes a hand grip dynamometer three times with each hand. Maximal grip of the three repetitions for each hand is recorded.

2. Muscle Cramps:-

Muscle cramps are defined as sudden, involuntary, and painful contractions of one or more muscle groups occurring during or within 30 minutes after a hemodialysis session. These cramps are typically reported by the patient and/or observed by healthcare personnel, and may result in temporary interruption or modification of the dialysis treatment.

3. Quality Of Life:-

Quality of Life (QoL) among hemodialysis patients in reference to resistance exercises is defined as the measurable change in physical, psychological, and social well-being of individuals undergoing maintenance hemodialysis, as assessed through a standardized instrument such as the Kidney Disease Quality of Life Short Form (KDQOL-36) or SF-36, before and after participation in a structured resistance exercise program.

Significance of the Study

Muscle cramps are a common and distressing complication among patients undergoing haemodialysis, affecting both their physical and psychological well-being. These painful episodes often occur during or after dialysis sessions and are associated with rapid shifts in fluid and electrolyte balance. Their frequent occurrence not only causes significant discomfort but also interferes with treatment adherence, leading to suboptimal dialysis outcomes (Ramos et al.,2020).

Understanding the relationship between muscle cramps and the quality of life (QoL) in haemodialysis patients is of particular importance. Quality of life encompasses various domains, including physical functioning, emotional well-being, and social participation, all of which can be negatively impacted by chronic pain or discomfort from muscle cramps. As such, this study contributes to a more comprehensive understanding of the symptom burden among dialysis patients and highlights an area often under-recognized in routine care (Cruz et al.,2021).

Furthermore, addressing muscle cramps could lead to significant improvements in patients' overall quality of life. Interventions aimed at preventing or reducing cramps—whether pharmacologic, nutritional, or through dialysis protocol modifications—may enhance patient satisfaction,

reduce treatment-related anxiety, and increase treatment compliance. The findings from this study may guide nephrologists, nurses, and other healthcare professionals in implementing patient-centred care approaches that take into account the holistic experiences of individuals undergoing haemodialysis (Weisbord et al.,2005).

Additionally, by emphasizing the significance of muscle cramps on QoL, the study can inform policy-makers and healthcare providers about the need for symptom management as a core component of dialysis care. This could ultimately influence clinical guidelines and patient education programs aimed at improving long-term outcomes in this vulnerable population.

Research Significance of Study:-

- Fills a Gap in Renal Rehabilitation: While aerobic exercise has been more widely studied, resistance training is still an emerging field in renal care research.
- Supports Development of Intradialytic Programs:
- Studies show safe implementation of exercise during dialysis sessions, making exercise more accessible for patients with limited energy or time.
- Contributes to Holistic Care: It Demonstrates that non-pharmacological interventions like exercise can be effective in improving clinical outcomes in chronic kidney disease (CKD).

Aim

The aim of this study is to evaluate the effectiveness of a structured resistance exercise program in reducing the frequency and severity of muscle cramps and improving the quality of life among patients undergoing maintenance haemodialysis.

Objectives of the Study

- To assess the impact of resistance exercise on the frequency and severity of muscle cramps among patients undergoing haemodialysis.
- To evaluate the effect of resistance exercise on the overall quality of life in haemodialysis patients, using a standardized quality of life assessment tool.

Operational Definitions

➤ **Effectiveness:** The effectiveness of resistance exercise for hemodialysis patients refers to measurable improvements in physical, functional, and dialysis-related outcomes resulting from a structured resistance training program. It is assessed using objective physiological, biochemical, and quality-of-life indicators.

➤ **Resistance Exercise–** Resistance exercises for hemodialysis patients refer to structured, repetitive muscle-strengthening activities performed using external resistance to improve muscle strength, endurance, and functional capacity. These exercises are typically performed during or between dialysis sessions, under medical supervision. The goal is to improve physical function, reduce muscle atrophy, enhance dialysis efficiency, and improve overall quality of life.

➤ **Muscle Cramps–** Muscle cramps are defined as sudden, involuntary, and painful contractions of one or more muscle groups occurring during or within 30 minutes after a hemodialysis session. These cramps are typically reported by the patient and/or observed by healthcare personnel, and may result in temporary interruption or modification of the dialysis treatment.

➤ **Quality Of Life–** Quality of Life (QoL) among hemodialysis patients in reference to resistance exercises is defined as the measurable change in physical, psychological, and social well-being of individuals undergoing maintenance hemodialysis, as assessed through a standardized instrument such as the Kidney Disease Quality of Life Short Form (KDQOL-36) or SF-36, before and after participation in a structured resistance exercise program.

❧ Hemodialysis: Hemodialysis is a medical procedure that uses a dialysis machine and a special filter called a dialyzer (artificial kidney) to remove waste products, excess fluids, and toxins from the blood when the kidneys are no longer functioning properly. The process involves drawing blood from the patient, passing it through the dialyzer where filtration occurs, and then returning the cleaned blood to the patient's body (commonly 3–4 times per week for 3–5 hours per session).

❧ Patients: Refers to both male and female participants age 18-60 years and have been diagnosed by a doctor as a CKD (chronic kidney disease) or ESRD (End Stage Renal Disease).

METHODOLOGY

The present study is a narrative review of effect on resistance exercise on Muscle Cramps and Quality of life among haemodialysis patients. Literature from 2018 to 2024 was searched using electronic database from PubMed, Google Scholar, ProQuest, SCOPUS Library and ResearchGate. The study is a Randomized Controlled Trial (RCT) to assess the effectiveness of resistance exercise on patients undergoing haemodialysis.

Electronic database search was done to extract the articles related to the theme of research problem and related terms using the keywords - “Chronic Kidney Disease” OR “Muscle cramps” OR “ESRD” AND “quality of life” AND “Hemodialysis AND resistance exercises” AND “randomized controlled trial” “Muscle cramps” AND quality of life” OR “Intradialytic exercise” AND “aerobic exercise ” OR “muscle strengthening exercise”.

A total of 12 articles were reviewed, that includes cross sectional surveys (incidence and prevalence studies), Randomized controlled trials and prospective randomized clinical trials and conclusion was drawn based on the review of articles findings.

Inclusion Criteria

- Articles related to patients undergoing Hemodialysis, muscle cramps, and quality of life related for kidney related disorders such as CKD (Chronic Kidney Disease) & ESRD (End Stage Renal Failure).
- Adult population age 18 years and above
- The paper which is easily accessible online
- The paper which was published in English language
- Research articles published from the year 2018 onwards

Exclusion Criteria

- The research studies which are not available in database source
- Not peer reviewed journal
- The research study which was published without DOI
- Patient who has comorbidities such as cardiovascular disease, neuropathy, diabetes foot etc.

Review of Literature:-

- ❧ SECTION I: Literature related to Resistance Exercise on Muscle Cramps among Haemodialysis patients.
- ❧ SECTION II: Literature related to Resistance Exercise on Quality of Life among Haemodialysis patients.

❧ MUSCLE CRAMPS:-

Study author, year, country	Title	Nature of the study	Sampling technique	Sample SIZE	Data Collection tool	Results
Khada F Shaban, Magda M. Melsien, Amal A. Elabbasy	Effect of Implementing Intradialytic Stretching Exercise on Reducing Muscle Cramps for Improving Quality of Life among Hemodialysis Patients	Quasi-Experimental Study	Convenience Sampling Technique	80	Structured interviewing questionnaire Cramp Questionnaire & KDQOL tool was used	The studied showed that hemodialysis patients who suffered low physical QoL, was increased from zero % in pre intervention to 71.3% in third month post intervention and the difference was highly significant (P=0.0001).

Study author, year, country	Title	Nature of the study	Sampling technique	Sample SIZE	Data Collection tool	Results
Ms. Jeyanthi san, Dr. C. Kannamm al, Mrs. Sheebah, ani	A Study to Assess the Effectiveness of Intradialytic Stretching Exercises on Muscle Cramps and Quality of Life in Patients Undergoing Hemodialysis at SRM General Hospital, Kankarathur	Quasi-Experimental Study	Purposive Sampling Technique	60	Muscle Cramps Assessment Scale and Quality Of Life Questionnaire	The study observed that stretching exercises were effective in reducing muscle cramps and improving the quality of life of patients undergoing hemodialysis (r=0.84, p=0.0001).

Study author, year, country	Title	Nature of the study	Sampling technique	Sample SIZE	Data Collection tool	Results
Radhika Vyas, Anila Bibhaq Malik, Shalini Sharma, et al.,	Effectiveness of leg exercises on muscle cramps among patients on hemodialysis in selected Government Hospitals, Dehradun, Uttarakhand	Quasi-Experimental Study	Purposive Sampling Technique	50	Structured Questionnaire- Designed to gather demographic information and baseline data on the frequency and severity of muscle cramps. Cramp Severity Scale	The study concluded that leg exercises are highly effective in reducing the frequency and severity of muscle cramps among hemodialysis patients. Implementing these exercises as part of the standard care protocol in dialysis units can greatly enhance patient comfort and overall well-being.

Study author, year, country	Title	Nature of the study	Sampling technique	Sample SIZE	Data Collection tool	Results
K. Anbu A. Rathiga	Effectiveness of Intradialytic Stretching Exercises on Muscle Cramps among Patients Undergoing Hemodialysis in a Selected Tertiary Care Hospital Kancheepuram District, Tamil Nadu, India	Quasi-Experimental Study	Purposive Sampling Technique	50	Structured questionnaire and demographic, Clinical variables & Modified cramps questionnaire chart was used to assess the effectiveness of intradialytic stretching exercises on level of muscle cramps.	The study findings concluded that in pre test 41(59.4%) of the patients in study group and 38(55.1%) of the patients in control group had mild muscle cramps whereas in post test 4(5.8%) of the patients in study group had severe muscle cramps and 16 (23.2%) of the patients in control group had severe muscle cramps.

Study author, year, country	Title	Nature of the study	Sampling technique	Sample SIZE	Data Collection tool	Results
Anjed Abdulabb as Shraida, Diaa K. Abd-Ali , Hisham Q. Mohammad	Effectiveness of Intradialytic Stretching Exercises on Prevention and Reduction of Leg Muscle Cramps among Patients undergoing Hemodialysis: Randomized Controlled Trial	Randomized Control Trial	Purposive Sampling Technique	50	Muscle Cramp questionnaire chart. Adapted with permission from Morris, (2014) (18) to assess the level of muscle cramps during hemodialysis, before and after the intervention	The study result signifies that the level of muscle cramps improved significantly among the study group participants compared with control group.

❧ QUALITY OF LIFE

Study author, year, country	Title	Nature of the study	Sampling technique	Sample SIZE	Data Collection tool	Results
Javid Z. MSc, Salari M. PhD, et al.,	Comparison of the Effect of Aerobic and Resistance Training on Quality of Life of Hemodialysis Patients	Clinical Trial	Convenience Sampling	64	Kidney Disease Quality of Life Short Form (KDQOL-SF)	There was no statistically significant difference in the mean score of public quality of life (p=0.8) between experimental and control group before intervention. There was statistically significant difference in the public and specific quality of life (p= 0.001) between aerobic and resistance training groups.

Study author, year, country	Title	Nature of the study	Sampling technique	Sample Size	Data Collection tool	Results
E. Segura-Ortiz, E. Kozak and J.F. Lison	Effect of resistance exercise during hemodialysis on physical function and quality of life: randomized controlled trial.	Multicentric study	Simple Random Sampling	27	Graded exercise test and SF-36 questionnaire	No differences were noted in change over-time between the two groups in any of the physical performance tests. However, a significant change was found in change over-time in right knee extensor muscle dynamometry, and intragroup analysis showed a significant improvement in resistance training groups in the physical performance tests and METs. These findings suggest that resistance training during hemodialysis improves patient's physical functioning.
Nailton J. B. de Albuquerque e Filho et al.	Resistance Training Improves Physical Fitness and Quality of Life in Patients on Hemodialysis	Comparative study	Purposive Sampling	29	The functional capacity by handgrip test and the 30-sec sit-to-stand test. Quality of life was assessed using the KDQOLSF-36 questionnaire.	The subjects showed gains in the functional capacity tests after the training program. Significant gains were found in the 30-sec sit-to-stand test (13.0 ± 5.0 vs. 25.0 ± 4.0; P=0.01). In the quality of life, were found an increase in the domains of renal disease (5% 20.7%, P = 0.01). Resistance training presented an increase in functional capacity in patients with chronic kidney disease submitted to hemodialysis, as well as improving domains related to quality of life.
Antônio Paulo André de Castro et al.	Intradialytic resistance training: an effective and easy-to-execute strategy	Prospective controlled study	Purposive Sampling	43	Intradialytic resistance training (IRT) is a pragmatic tool	The mean follow-up time was 9.3 ± 3.24 months, for a total of 4,374 sessions of IRT. Compliance to the protocol was 96.5 ± 2.90%, and patients presented significant improve ments in M ₀ (from 27.3 ± 11.58 Kg to 34.8 ± 10.77 Kg) and PWS (from 0.99 ± 0.29 m/s to 1.36 ± 0.22 m/s). Physical and emotional components of QoL also increased significantly.

Limitations

- ☞ Small Sample Sizes
- ☞ Short Duration of Intervention
- ☞ Heterogeneity in Exercise Protocols
- ☞ Methodological Concerns
- ☞ Lack of Long-Term Follow-Up
- ☞ Limited Focus on Diverse Populations
- ☞ Ethical and Safety Considerations
- ☞ Underreporting of Adverse Events

CONCLUSION

- ★ Resistance exercise is gaining recognition as an important intervention to improve the health and quality of life of patients undergoing hemodialysis.
- ★ Hemodialysis patients often face challenges such as muscle wasting (sarcopenia), fatigue, poor physical function, and an increased risk of cardiovascular disease.
- ★ Resistance exercise can play a key role in addressing these issues by helping to preserve muscle mass, enhance physical strength, and improve overall health

Future Scope

Resistance exercise holds significant promise for improving the overall health and quality of life of hemodialysis (HD) patients, but there is still much to explore regarding its full potential. As the field of exercise science for kidney disease progresses, several opportunities exist to refine our understanding and optimize the use of resistance exercise in this unique patient population.

The study may inspire the development of personalized exercise protocols tailored to individual fitness levels and health conditions, potentially improving adherence and outcomes. Future investigations could also examine the cost-effectiveness of incorporating exercise regimens into dialysis care, which could influence clinical practice guidelines and health policy decisions.

Long-Term Impact Studies:

- Future research should explore the long-term effects of

resistance training on dialysis adequacy, especially over periods longer than 6–12 months, to assess sustained benefits on URR and Kt/V.

Larger, Multi-Centre Trials:

- Conducting large-scale, multicentre randomized controlled trials will help validate findings across diverse populations and increase the generalizability of the results.

Personalized Exercise Programs:

- Developing individualized resistance training protocols based on age, comorbidities, and physical condition may optimize outcomes in dialysis efficiency and patient safety.

Cost-Effectiveness and Quality of Life Evaluation:

- Future research could also assess the economic benefits and quality of life improvements associated with resistance training programs in haemodialysis care models.

Exploring Mechanisms:

- Investigating the underlying biological mechanisms by which resistance exercise affects solute clearance (e.g., increased blood flow, improved muscle metabolism) could offer new insights into optimizing dialysis).

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