International Journal of Research and Review
Volume 11; Issue: 8; August 2024
Website: www.ijrrjournal.com
Review Article *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Renal Rehabilitation - An Effective Treatment Strategy for Physical and Functional Limitation in Patients with Chronic Kidney Disease (CKD): A Review Report

Dr. Shreya Trivedi (PT)

Department of Physiotherapy, Krishna School of Physiotherapy & Rehabilitation, KPGU, Vadodara, India

DOI: https://doi.org/10.52403/ijrr.20240805

ABSTRACT

Chronic kidney disease (CKD) is defined as glomerular filtration rate (GFR) less then 60ml/min and albumin higher then 30mg/gm of creatinine along with structural abnormalities of kidney more than 3 months. When GFR >15ml/min is known as End stage renal disease (ESRD). When the CKD progress towards ESRD, various treatment from a form of dialysis to transplantation is prescribed to prevent prognosis and extend the life expectancy. Renal rehabilitation (RR), same as other rehabilitative strategies is a holistic approach to provide multidimensional, coordinated intervention program designed to optimize unique treatment needs of CKD patient. RR is safe and enhances physical, psychological and social wellbeing of CKD or ESRD patient.(8,9) despite of its effectiveness it's not include in usual treatment regimen worldwide including India. an effort is made to analyze various literature and guidelines available about renal rehabilitation which will help in understanding clinical implications of renal rehabilitation in patient with CKD. Total 275 Articles were retrieved from various search engines through PubMed, PEDRO, Google scholar and Research gate ranging from year 2014 to 2024. The current review was conducted as per PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The prevalence of CKD is increasing day by day globally and also in India. Renal Rehabilitation is a multifaced team approach which can play significant role in improving physical and psychosocial wellbeing and Quality of life of patient with CKD at all stages including haemodialysis and transplantation.

Keywords: Renal Rehabilitation, Rehabilitation, Chronic Kidney Disease

INTRODUCTION

Chronic kidney disease (CKD) is defined as glomerular filtration rate (GFR) less then 60ml/min and albumin higher then 30mg/gm of creatinine along with structural abnormalities of kidney more than 3 months. When GFR >15ml/min is known as End stage renal disease (ESRD). When the CKD progress towards ESRD, various treatment from a form of dialysis to transplantation is prescribed to prevent prognosis and extend the life expectancy. (1,2) CKD is becoming a global burden with high incidence and prevenance in developing countries including in India. The prevalence of CKD in India is 800 per million population. Among this the rate of transplantation relatively low because of several reasons. (3,4) The CKD patients demonstrate physical and functions along with other disease related symptoms problems such as sarcopenia, frailty, fatigue, muscle weakness, poor exercises capacity

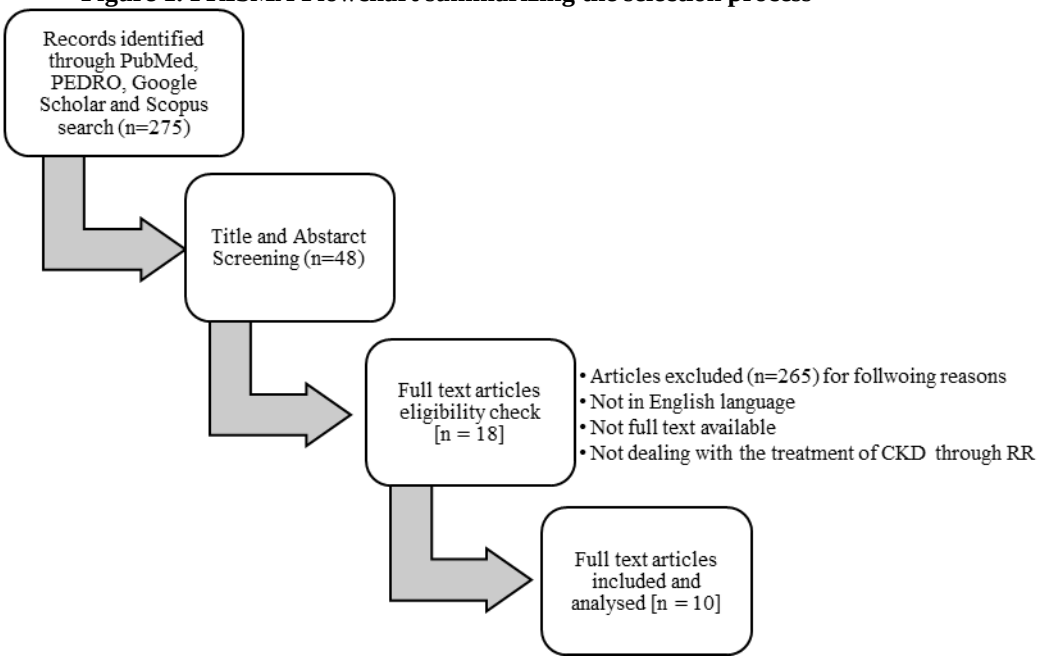
and limited functional independence which further can lead to depression and poor Quality of life(QoL). (5–7)

Renal rehabilitation (RR), same as other rehabilitative strategies is a holistic approach to provide multidimensional, coordinated intervention program designed to optimize unique treatment needs of CKD patient. RR is safe and enhances physical, psychological and social wellbeing of CKD or ESRD patient.(8,9) despite of its effectiveness it's not include in usual treatment regimen worldwide including India. the effect of exercises in patient with CKD is well researcher and proven effective in literature still it is not considered as an essential part of the treatment. It is stated in researches that healthcare professionals working with CKD patients need to focus of management of sarcopenia and physical frailty through rehabilitation. (10) Hence the need of study arises and in this current review an effort is made to analyze various literature and guidelines available about renal rehabilitation which will help in understanding clinical implications of renal rehabilitation in patient with CKD.

MATERIALS & METHODS

The current review was conducted as per PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The Author completed the process of reviewing titles, abstract, full text screening, identifying inclusion- exclusion criteria. The articles were searched through key words as Renal rehabilitation, Rehabilitation in chronic kidney disease, Rehabilitation of End stage renal disease. Total 275 Articles were retrieved from various search engines through PubMed, PEDRO, Google scholar and Research gate ranging from year 2014 to 2024. The article stating guidelines of renal rehabilitation, in English language and variable as full text were included. The articles not meeting all the inclusion criteria were excluded from this review. At the end of selection process total 10 articles were included in the review. The process is shows in figure.1.

Figure 1. PRISMA Flowchart summarizing the selection process



RESULT

In the current review data 10 articles were extracted and analysed through Microsoft excel version 2405, windows 11 23H2. The overview of articles is given in table.1 below. The several guidelines about renal rehabilitation were found in literature along with its history, effect in patient with CKD and current scenario in clinical practice. While searching for the articles it was found

that concept of RR is not new still is not commonly practised. The majority researches about RR were conducted in Japan following Italy, Canada, China and USA and minimum to no study were conducted in India were found.

Table.1 Overview of article included in the current review(7–16)

No	Authors	Title	Aim	Conclusion
1	Domenico Intiso	The Rehabilitation Role in Chronic Kidney and End Stage Renal Disease	To highlight the role and effects of RR on CKD/ESRD patients	CKD is a complex condition and patients in the world with CKD/ESRD are remarkably high. CKD is a global health related problem. CKD patients demonstrate physical and function disabilities and exercises training or multidimensional and goal-oriented rehabilitation should be provided to this population to reduced disability occurrence and disease burden.
2	Hamid Arazi, Majid Mohabba Hamid Arazi et.al	Effects of Different Types of Exercise on Kidney Diseases	To investigate effects of various exercises on Patients with CKD	The effects of various exercises are beneficial in patient with CKD, whether during or outside dialysis session, Aerobic and strength training if accompanied with safety consideration shows significantly improves. the stage of kidney disease should be considered prior to prescribe exercises and protocol should be tailored based according to patients' individual needs.
3	Hiroshi Bando, Yoshikane Kato	Various roles of renal rehabilitation including prevention and improvement of renal function, cardiovascular disease, flail and life prognosis	To study Various roles of renal rehabilitation renal function, cardiovascular disease, flail and life prognosis in CKD patients	The prevalence of frailty prevention is high in patient with CKD. Nutritional deficits, Uremia Diabetes and systemic inflammation can affect physical function and frailty in patient with CKD. Patient who participates in exercises have better quality of life and disease prognosis.
4	Ryota Matsuzawa	Renal rehabilitation as a management strategy for physical frailty in CKD	To update the evidences of exercises intervention for hemodialysis patients from recent researches and to compare benefits of RR on physical health and health related QoL of patient with CKD	Concept of RR is widely known still the its uncommon in routine practice. Patient who are on hemodialysis have higher mortality rates. Sarcopenia and Functional dependence is a major contributor for the same. Impatient mobility. Low functionality and weak muscles are primary component of frailty. Active participation in exercise ma reduced mortality and result in lower cardiovascular event compare to those who do not participate in exercise programs. Significant efforts from kidney health care professionals in this direction are desirable.
5	Junichi Hoshino	Renal Rehabilitation: Exercise Intervention and Nutritional Support in Dialysis Patients	To review the history and concept, current status and future implementation of RR in CKD patients.	Dialysis associated are frontline professional involved oved on treatment of CKD. They can be considered as the best gatekeeper in RR. RR is a new concept and should be combined to other

				multidisciplinary approaches to create sustainable environment for RR
6	Ryota Matsuzawa, Daisuke Kakita	Renal Rehabilitation—Its Theory and Clinical Application to Patients Undergoing Daily Dialysis Therapy	To investigate theory and clinical application of RR in patient undergoing hemodialysis	High mortality rates in patient with Hemodialysis in CKD is due to high disease burden. Recent evidences suggest that physical frailty can be a limiting factor for transplantation also. Even though the concept of RR is well known, the practice of RR is not common and should be considered important while treating physical function in patient with CKD.
7	Masahiro Kohzuki	Renal Rehabilitation: Present and Future Perspectives	To review history and benefits of RR in patient with CKD	RR is an effective feasible and safe for patient with CKD. RR is a coordinated, multifaceted intervention designed to optimize a patent's physical, psychological and social functioning in addition to stabilize, slow down or reverse the progression of renal deterioration, improving exercises tolerance and preventing cardiovascular incidents. With RR morbidity and mortality can be reduced.
8	Stephanie Thompson, Michael K. Stickland	Exercise Rehabilitation for People with End-Stage Kidney Disease: Who Will Fill the Gaps?	To provide an overview of the disease burden and summaries effect of exercise intervention in patient with CKD	Dialysis dependent patients demonstrate low exercises tolerance. Use of exercises a apart of intervention is prioritized by patients. There is a lack of infrastructure for kidney disorders. Biases are found in clinical trials however the evidences are available showing improvement in physical function with exercises consistently. Exercises is a new and promising tool to that is unarguable in the purview of nephrologist. Thoughtful consideration of exercises as method to improve physical functional frailty is required to fill the gap between understanding exercises as a hobby and an intervention tool
9	Stefanie K. Whalen, Alexis King	The Necessity for Renal Rehabilitation	To review the development and implementation of RR and effect of RR in improving QoL in patient with CKD	Exercises are essential to maintain healthy lifestyle in patient with CKD. Patient with CKD lack in knowledge about exercises programming. Proper guidance and supervision of a expert can engage in exercises in the best and most appropriate way to improve physiological and psychological functioning. Aerobic and resisted training in combination shows positive effect in improving fitness in patient with CKD. RR would serve to bridge gap between the knowledge of clinicians and daily

				incorporation of exercises.
10	Osamu Ito	Renal rehabilitation in patients with chronic kidney disease	To review the effects and benefits of regular exercises on non-hemodynamic patient with CKD.	RR can improve not only QoL but also the life span of patient with CKD. Future randomized control, trails should focus on rehabilitation program in patient with CKD

DISCUSSION

Globally the patients with CKD are increasing day by day theses patient with CKD demonstrate physical and functional limitation such as physical frailty, sarcopenia and fatigue. In this review, after screening 275 articles, total 10 articles were included for review process based on inclusion and exclusion criteria. In these articles the history of Renal rehabilitation, effect of renal rehabilitation and dosage of exercises were explained which are comprehensively explained below.

HISTORY OF RENAL REHABILITAION

The concept of RR is popular in Japan. In 2011, The Society of Renal Rehabilitation (JSRR) was established to promote and disseminate RR in Japan and in 2019 they introduced RR guidelines for RR targeting non-dialysis-dependent and dialysis dependent patients. Japan is the leading country contributing in the field of RR through researches, structured guidelines, insurance reimbursement for RR. In India concept of renal rehabilitation is still uncommon. In past exercises based rehabilitation were restricted for patient with CKD but with researches beneficial roles of exercises were advocated for prevention and improvement of flail, QoL and renal function and overall life expectancy. (9–11)

THE TEAM AND COMPONENTS OF RR

According to the JSRR the Renal Rehabilitation comprise of 5 components, starting with Exercises, Diet & Fluid management, Medication & Medical surveillance, Education and lastly Psychological & Vocational Counselling. The team of rehabilitation may include the nephrologist, rehabilitation therapist, nutritionist, nurses, dialysis expert, social worders, pharmacist etc. The exercises prescription can be grossly categorized for non-dialysis patient, hemodialysis patient and patient with Kindly Transplanted. The exercise prescription comprise of Aerobic exercises, Muscle strength training and flexibility training and weight management which are discussed further in details in this review. (9,17,18)

PHYSICAL AND FUNCTIONAL LIMITATIONS & EXERCISES IN PATIENT WITH CKD

Sarcopenia and Frailty are evident in patient with CKD because of loss of amino acids and protein. It is also associated with muscle wasting. This leads to weakness and decreased functional independence in patients with CKD. Exercises may help in prevention in sarcopenia and also can help regain the muscle strength. (5)

The non-dialysis patient (stage 1-5 CKD) should be encouraged to participate in the regular physical activity in form of aerobic exercises, muscle strengthening exercises and flexibility training. Those who are sedentary for them Aerobic exercises for 150 minutes/week of moderate intensity is recommended. Those who are already physically active many incorporate of 75 minutes of vigorous aerobic exercises. Along with aerobic exercises muscle strength training and flexibility training at least 2 days per week should be included in regimen. Strength training intensity should be moderate to vigorous with 60-70% of 1 Repetition maximum and 1 to 3 sets with8 to 12 repetitions in each set. The exercises intensity and duration should be gradually buildup and pre exercises screening for contraindication should be done. Self-monitoring of anthropometric measurement

for weight management along with health lifestyle should be emphasized.

For patient undergoing hemodialysis, Aerobic exercises for 150 minutes/week of moderate intensity (or 75 minutes vigorous intensity exercises or combination of moderate and vigorous- 55 to 90% HRmax, RPE of 12–14) is recommended. Thorough assessment for exercises related contraindication should be done According to UK Chief Medical Officers' Guideline. The exercises may be incorporated interdialytic (outside of dialysis) or intradialytic (during dialysis) phases. With no contraindications to exercises intradialytic exercises is safe. Weight management is important for such patients and individuals receiving hemodialysis should maintain BMI between 20 to 30 kg/m2. Such patient should quit smoking and live a healthy lifestyle to minimize the comorbidities.

In patient with transplantation, it is pre- and post-transplant physical activity is recommended for to reduce all-cause and cardiovascular. Contraindication for exercise should be checked. Structured exercises program including aerobic and strength training is recommended. 150 mins of moderate exercises can reduce all cardiovascular mortality with minimum 3 days per week. Appropriate weigh management strategies are suggested. A tailored based exercises program is preferable for meeting needs and goals of an individual.

In Prehabilitation stage prior to surgery physical activity is advisable and may aid recovery. Immediately post-transplant physical activity, that is <1-2 days is not beneficial in increasing recovery or attenuate the decline in physical function. Mobility prescribed as per standard post operative care should be continued. In post-operative phase contact sports and vigorous activity should be considered carefully and any traumatic damage should be avoided. Weight management strategies should be incorporated and healthy lifestyle should be encouraged in such patients.

The prescribed physical activity helps improving blood pressure and exercises capacity, reduced cardiovascular and other combabilities, prevents fatigues, and improved quality of life. It also plays role in reducing hospitalization stay and effectiveness of dialysis. (7,16,19,20)

CONCLUSION

The prevalence of CKD is increasing day by day globally and also in India. Renal Rehabilitation is a multifaced team approach which can play significant role in improving physical and psychosocial wellbeing and Quality of life of patient with CKD at all stages including hemodialysis and transplantation. Availability of research found in India about RR is limited and there is vast scope of future research in this direction. The effectiveness is well-researched in past and found beneficial its implementation in clinical practice should be encouraged by healthcare professionals working with CKD patients.

Declaration by Authors

Ethical Approval: Not Applicable
Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Agarwal R. Defining end-stage renal disease in clinical trials: a framework for adjudication: Table 1. Nephrol Dial Transplant. 2016 Jun;31(6):864–7.
2. Hashmi MF, Benjamin O, Lappin SL. End-Stage Renal Disease. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [cited 2024 Jul 24]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK499861/
3. Agarwal SK, Srivastava RK. Chronic Kidney Disease in India: Challenges and Solutions. Nephron Clin Pract. 2009 Feb 5;111(3):c197–203.
4. Jha V. Current status of end-stage renal disease care in India and Pakistan. Kidney Int Suppl. 2013 May;3(2):157–60.

5. Duarte MP, Almeida LS, Neri SGR, Oliveira JS, Wilkinson TJ, Ribeiro HS, et al. Prevalence of sarcopenia in patients with chronic kidney disease: a global systematic review and meta-analysis. J Cachexia Sarcopenia Muscle. 2024 Apr;15(2):501–12.
6. Broers NJH, Martens RJH, Cornelis T, Van Der Sande FM, Diederen NMP, Hermans MMH, et al. Physical Activity in End-Stage Renal Disease Patients: The Effects of Starting Dialysis in the First 6 Months after the Transition Period. Nephron. 2017;137(1):47–56.
7. Bulighin F, Aucella F, Bellizzi V, Cupisti A, Faga T, Gambaro G, et al. Physical activity and exercise programs for kidney patients: an Italian survey of nephrology centres. J Nephrol. 2024 Mar 6;37(3):695–705.
8. Intiso D. The Rehabilitation Role in Chronic Kidney and End Stage Renal Disease. Kidney Blood Press Res. 2014;39(2–3):180–8.
9. Kohzuki M. Renal Rehabilitation: Present and Future Perspectives. J Clin Med. 2024 Jan 18;13(2):552.
10. Matsuzawa R. Renal rehabilitation as a management strategy for physical frailty in CKD. Ren Replace Ther. 2022 Dec;8(1):3.
11. Bando H, Kato Y. Various roles of renal rehabilitation including prevention and improvement of renal function, cardiovascular disease, flail and life prognosis. Int Phys Med Rehabil J. 2020 May 25;5(3):118–20.
12. Hoshino J. Renal Rehabilitation: Exercise Intervention and Nutritional Support in Dialysis Patients. Nutrients. 2021 Apr 24;13(5):1444.
13. Matsuzawa R, Kakita D. Renal Rehabilitation - Its Theory and Clinical Application to Patients Undergoing Daily Dialysis Therapy. Kidney Dial. 2022 Nov 3;2(4):565–75.
14. Thompson S, Stickland MK, Wilund K, Gyenes GT, Bohm C. Exercise Rehabilitation for People With End-Stage Kidney Disease: Who Will Fill the Gaps? Can J Cardiol. 2023 Nov;39(11):S335–45.
15. Whalen SK, King A, Wilund K, Germain MJ, Headley SAE. The Necessity for Renal Rehabilitation. J Clin Exerc Physiol. 2020 Sep 1;9(3):118–30.
16. Arazi H, Mohabbat M, Saidie P, Falahati A, Suzuki K. Effects of Different Types of Exercise on Kidney Diseases. Sports. 2022 Mar 10;10(3):42.
17. Yamagata K, Hoshino J, Sugiyama H, Hanafusa N, Shibagaki Y, Komatsu Y, et al. Clinical practice guideline for renal rehabilitation: systematic reviews and recommendations of exercise therapies in patients with kidney diseases. Ren Replace Ther. 2019 Dec;5(1):28.
18. Baker LA, March DS, Wilkinson TJ, Billany RE, Bishop NC, Castle EM, et al. Clinical practice guideline exercise and lifestyle in chronic kidney disease. BMC Nephrol. 2022 Feb 22;23(1):75.
19. Smart NA, Williams AD, Levinger I, Selig S, Howden E, Coombes JS, et al. Exercise & Sports Science Australia (ESSA) position statement on exercise and chronic kidney disease. J Sci Med Sport. 2013 Sep;16(5):406–11.
20. Milam RH. Exercise Guidelines for Chronic Kidney Disease Patients. J Ren Nutr Off J Counc Ren Nutr Natl Kidney Found. 2016 Jul;26(4):e23-25.

How to cite this article: Shreya Trivedi. Renal rehabilitation - an effective treatment strategy for physical and functional limitation in patients with chronic kidney disease (CKD): a review report. *International Journal of Research and Review*. 2024; 11(8): 38-44. DOI: *https://doi.org/10.52403/ijrr.20240805*

******