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BENEFITS OF INTRADIALYTIC PHYSIOTHERAPY IN CHRONIC KIDNEY PATIENTS: AN INTEGRATIVE REVIEW

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Abstract: Introduction: Chronic Kidney Disease (CKD) ischaracterized by a renal dysfunction in which it occurs slowly, progressively and irreversibly. It has an increasing incidence and prevalence, being considered an important public health problem, since both the disease and the treatment have a great impact on the entire life context of the affected person. Hemodialysis (HD) replaces kidney function, reverses uremic symptoms and preserves the lives of patients with CKD, but disease progression still leads to the development of uremic myopathy, which is characterized by muscle loss and reduced physical capacity. This condition affects not only the locomotor muscles, but also the respiratory muscles, also compromising the patient's quality of life. Objective: The aim of this work was to investigate studies in the literature that address physiotherapeutic intervention in systemic alterations caused in chronic renal patients, so that the analysis can serve as a parameter to guide, in the future, better physiotherapy approaches during the HD process. Methods: This is an integrative review carried out from the Scielo, PubMed and Lilacs databases, of articles published between 2019 and 2023, in Portuguese, English and Spanish. Results: Exercise interventions in CKD prove to be an important therapeutic tool that has favorable effects on the patient's health and quality of life. Conclusion: It is possible to state that physical exercise enhances preventive action and also delays the disorders resulting from kidney disease, being used to combat sedentary lifestyle and, thus, improve the muscle strength of patients with CKD and respiratory function during hemodialysis, expanding the field of action for physiotherapy.

Keywords: Chronic Kidney Disease; Hemodialysis; Intradialytic Physiotherapy.

INTRODUCTION

Chronic Kidney Disease (CKD) has a growing incidence and prevalence, being considered an important public health problem, since both the disease and the treatment have a great impact on the entire life context of the affected person, making it if, thus, an important cause of morbidity and mortality (FERREIRA et al., 2022).

According to the Brazilian Society of Nephrology, the estimate of CKD in the world is 7.2% for people over 30 years old and 28% to 46% in individuals over 64 years old. In Brazil, it is estimated that more than ten million people have the disease (NASCIMENTO; SANTOS, 2022).

CKD is characterized by a renal dysfunction in which it occurs slowly, progressively and irreversibly, and in its more advanced stages, the kidneys are no longer able to maintain internal homeostasis, altering the Glomerular Filtration Rate, which makes it possible to stage the disease (SOUZA et al., 2019; RODRIGUES et al., 2021).

Hemodialysis (HD) replaces kidney function, reverses uremic symptoms and preserves the lives of patients with CKD, but disease progression still leads to the development of uremic myopathy, which is characterized by muscle loss and reduced physical capacity. This condition does not only affect the locomotor muscles, but also the respiratory ones, as there is a decrease in inspiratory and expiratory strength as the CKD progresses, thus contributing to greater lung weakness and, consequently, to a decrease in its functional capacity (DORNELES et al., 2019; OLIVEIRA et al., 2022).

In view of the above, this work sought to investigate studies in the literature that address physiotherapeutic intervention in systemic changes caused in chronic renal patients, so that the analysis can serve as a parameter to guide, in the future, better approaches to physical therapy during the hemodialysis process, which can minimize such effects, and expand the field of action of this professional.

METHODOLOGY

The article was developed, according to the precepts of an exploratory study, being, therefore, an integrative review, elucidating the benefits of intradialytic physiotherapy in chronic renal patients. The identification of the articles was carried out through searches of the Scielo, PubMed and Lilacs databases for articles published between the years 2019 to 2023, in Portuguese, English and Spanish.

The collection was carried out in the period between May and June 2023 and the following keywords were used: Chronic Kidney Disease, Hemodialysis and Intradialytic Physiotherapy.

Studies relevant to the topic were selected, with the inclusion criteria being articles in Portuguese or English, published between the years 2019 to 2023 and that make the full text available free of charge. And considering exclusion criteria, scientific articles that were not within the stipulated period of the research, works in other languages and studies in which the patient was not undergoing hemodialysis associated with physiotherapy were discarded.

RESULTS

The results found are shown in Figure 1, which covers the flowchart with the eligibility and ineligibility criteria used in the selection of articles for carrying out the integrative review. Initially, 4,570 articles were identified from the search for the descriptors: Physiotherapy and Chronic Kidney Disease or Hemodialysis, in the Lilacs, PubMed and Scielo databases. Then, using the established methodology (period of publication, language, free full text), n reduced to 26 articles. Of these, 11 articles were selected for inclusion in this work. Chart 1 presents a comparative

dissertation, separating it into author and year, study title and conclusions about the impact of intradialytic physiotherapy.

In view of the findings, 10 articles were analyzed according to the following aspects: main author and year of publication, title and conclusions of the research addressing the impact of physiotherapy performed during hemodialysis therapy (Chart 1).

DISCUSSION

Kidneys are essential and vital organs and have the following functions: Eliminate catabolites, regulate hydroelectrolytic homeostasis, regulate systemic blood pressure, synthesize hormones, degrade circulating peptides, among others. The functional unit of the kidney is called nephron, and this has the function of purifying blood plasma, this phenomenon occurs in a process called glomerular filtration. When there is a reduction in the number of functioning nephrons and glomerular filtration falls below 15 mL/min, Chronic Kidney Disease appears and the patient is indicated for hemodialysis (NASCIMENTO; SANTOS, 2022).

JÚNIOR (2019) classifies CKD into 6 functional stages, according to the degree of renal function of the patient:

Ribeiro et al (2020) report that:

> Data from the 2016 census on dialysis in Brazil, made available by the Brazilian Society of Nephrology (SBN), estimated that, in that year, more than 122 thousand patients were undergoing dialysis treatment in the country, an increase of about three times the number of patients in the same type of treatment in 2000.

Among the causes ofDCR, the following stand out: diabetes mellitus, arterial hypertension, glomerulonephritis, cystic diseases of the kidneys, collagen vascular diseases, malignancies, among others (COSTA et al., 2019; RIBEIRO et al., 2020).

Ferreira et al. (2022) state thatthe treatment of DCR implies performing Renal Replacement Therapy (RRT), which can be done through: Hemodialysis (HD), Peritoneal Dialysis, or Renal Transplantation. Among the three forms, Hemodialysis (HD) is the most widespread.

Hemodialysis is an extracorporeal renal replacement therapy, through a device called a dialyzer, with the aim of replacing the function of the kidneys, removing uremic toxins and excess fluid from the blood (ZHANG; GUO; MING, 2020). The hemodialysis procedure lasts 3 to 4 hours a day, with a frequency of 2 to 4 times a week, according toCarvalho and Barella (2022). Making the procedure expose patients to prolonged inactivity, contributing to the loss of functional capacity and physical deconditioning (FERREIRA et al., 2022).

Ferreira et al. (2022) point out that the repercussions of CKD on the body go beyond the urinary tract, reaching the body globally and exposing patients to a series of complications, such as: increased frailty, reduced muscle mass, sleep disorders, central and peripheral neurological, gastrointestinal, endocrinological, metabolic, infectious, dermatological and hematological manifestations. However, they mainly affect the respiratory, cardiovascular and musculoskeletal systems (RODRIGUES et al., 2021).

Chronic renal patients are characterized by low levels of physical activity, due to their clinical condition and the hemodialysis treatment routine itself, which induces a sedentary lifestyle. It is known that this behavior negatively affects Quality of Life (QoL), functional status and is strongly related to mortality and morbidity throughout the disease trajectory (WILKINSON et al., 2020).

Exercise interventions in CKD prove to be an important therapeutic tool that has favorable effects on the health and quality of

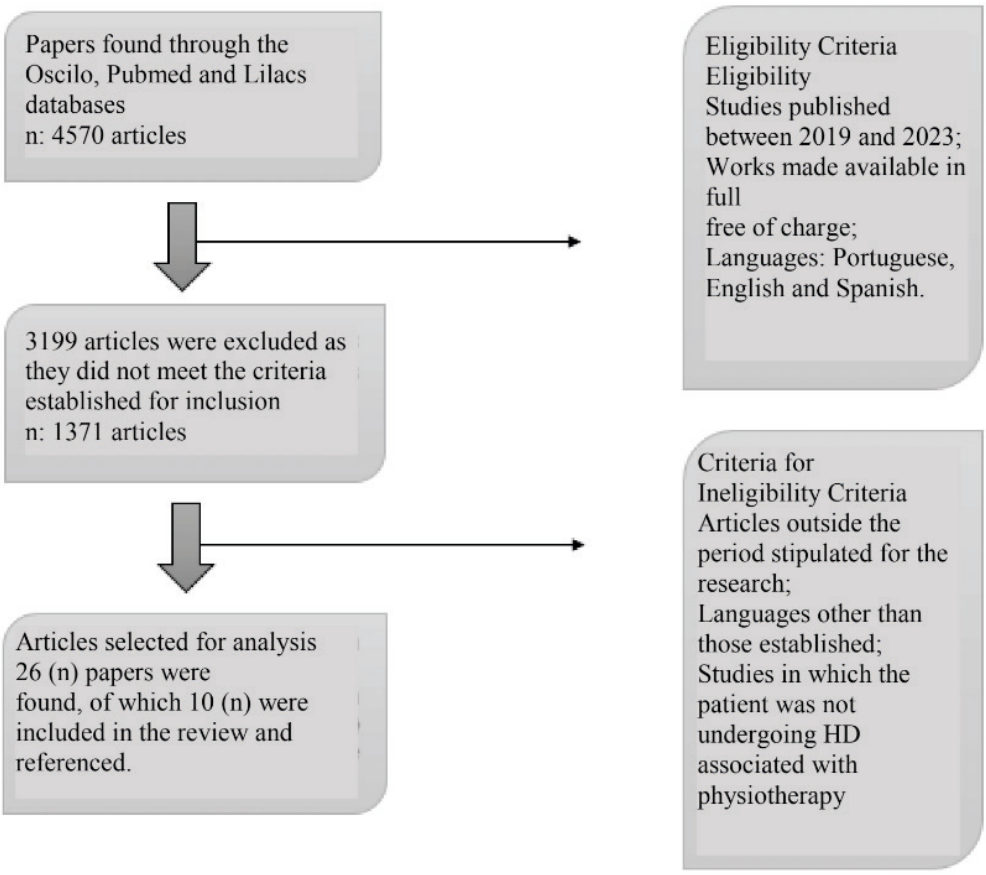

Figure 1: Flowchart with the analyzes used for inclusion and exclusion of scientific articles used in the review.

Chart 2: CKD classification

Phase 1	Normal kidney function, without any injury, includes people in the risk group.
Phase 2	He has a lesion, but with normal renal function and preserved GFR.
Phase 3	Occurs at the onset of loss of kidney function. At this stage, plasma urea and creatinine levels are still normal, there are no important clinical signs or symptoms of renal failure, and only accurate methods of evaluating kidney function (depuration methods, for example) will detect these abnormalities.
Phase 4	Laboratory or moderate renal insufficiency. Simple laboratory evaluation almost always shows high levels of plasma urea and creatinine.
Phase 5	The patient has severe renal impairment and is already suffering from renal dysfunction. The most common signs and symptoms appear, such as anemia, high blood pressure, edema, weakness, digestive symptoms.
Phase 6	End-stage chronic renal failure - as the name implies, corresponds to the range of renal function in which the kidneys have lost control of the internal environment, making it sufficiently altered to be incompatible with life. In this phase, the patient is intensely symptomatic. Its therapeutic options are artificial blood purification methods (peritoneal dialysis or hemodialysis) or kidney transplantation. Comprises a glomerular filtration rate of less than 15 ml/min

Author and Year	Title	Conclusions
ABDO et al., 2019	Quadriceps muscle strength after cycle ergometer training in hemodialysis patients	Quadriceps muscle strength improved after patients with chronic kidney disease undergoing hemodialysis underwent cycle ergometer training.
BOGATAJ et al., 2020	Functional training added to intradialytic cycling lowers low-density lipoprotein cholesterol and improves dialysis adequacy: a randomized controlled trial	We demonstrated that functional training added to intradialytic cycling improved the lipid profile and dialysis adequacy. This study supports the assumption that combined training is more effective compared to exclusively intradialytic exercise.
FRANCISCO et al., 2020	Is peripheral muscle weakness an exercise limitation in chronic kidney disease?	Peripheral muscle weakness is an important limiting factor for exercise in CKD, and HD patients show a decline in peripheral muscle strength and exercise capacity when compared to healthy individuals.
FRANCISCO et al., 2020	Relationship between handgrip strength and lung capacity in hemodialysis patients	The decrease in lung capacity may be related to the decline in handgrip strength in patients with chronic kidney disease on hemodialysis. Thus, therapeutic strategies aimed at lung expansion and respiratory muscle training can contribute to facilitate and favor rehabilitation in this population.
SAMPAIO and CAMPOS, 2023	Muscular resistance program for lower limbs improves uremic sarcopenia	The LL muscle resistance program was effective, as it increased functional physical performance with gains in strength and muscle endurance in HD patients.
HARGROVE et al., 2021	Effect of aerobic exercise on dialysis-related symptoms in individuals undergoing maintenance hemodialysis: a systematic review and meta-analysis of clinical trials	Our review suggests that in adults on maintenance HD, aerobic exercise improves several HD-related symptoms, including restless legs syndrome, symptoms of depression, muscle cramps, and fatigue.
RHEE et al., 2019	Intradialytic exercise improves physical function and reduces intradialytic hypotension and depression in hemodialysis patients	Combined aerobic and anaerobic exercise training during dialysis has been shown to be effective on physical health status, intradialytic hypotension and depression in terms of mental health.
SEGURA-ORTÍ et al., 2019	Virtual reality exercise intradialysis to improve physical function: a randomized feasibility study	Virtual reality was a viable intervention. Both interventions improved physical function.
SILVA et al., 2021	Respiratory muscle strength and quality of life in patients with chronic kidney disease manifested by hemodialysis	Patients with CKD on HD had a reduction in MEP and MIP, although the clinical relevance of this finding is uncertain.
RODRIGUES et al., 2021	Evaluation of Autonomous Modulation of Heart Rate in Patients with Chronic Kidney Disease Undergoing Hemodialysis: Preliminary Study	Hemodialysis patients with CKD have reduced parasympathetic modulation compared to healthy individuals, suggesting an autonomic cardiac dysfunction.

Table 1: Comparative dissertation between researches on the effectiveness of physiotherapy during HD.

life of the patient (BARBOSA et al., 2021).

Rhee et al. (2019) add that performed in the intradialytic modality, it presents itself as a safe intervention, and provides great adherence to treatment, especially in the first years of implementation, taking these individuals out of a state of inactivity and monotony. And to facilitate this adherence, Segura-Ortí et al. (2019) demonstrated in their research that intradialysis virtual reality exercises, in addition to being a playful modality for the patient, mainly improve physical function. As well as corroborate for the decrease in the risk of cardiovascular diseases, reduction of chronic inflammatory markers and improvement of functional capacity and muscle strengthening.

Physiotherapy has preventive skills, improvements and delay of complications from kidney disease. Abdo et al. (2019) demonstrate that a physiotherapeutic intervention protocol in patients with RD during HD can still be effective in increasing quadriceps muscle strength, handgrip strength, which is directly related to lung capacity and expiratory muscle strength (FRANCISCO et al. al., 2020; SILVA et al., 2021; SIMÕES et al., 2020).

Quadriceps muscle strength is one of the three criteria for defining sarcopenia (muscle mass, muscle strength and functional performance), a clinical condition related to changes in body composition associated with aging (FRANCISCO et al., 2020). The reduction in muscle strength leads to undesirable outcomes and higher morbidity, especially in the population. Carvalho and Barella (2021) also corroborate by stating that myopathy, muscle atrophy or uremic polyneuropathy are musculoskeletal disorders attributed to hemodialysis, due to the period of inactivity during RRT.

The works by Zhang, Guo and Ming (2020) and Bogotaj et al. (2020) demonstrated that resistance intradialytic exercise with high load increased lean mass and improved the "pain" and "physical function" domains in QoL. In addition, Sampaio and Campos (2023) also show that patients who could take advantage of the progressive resistance exercise modality obtained good physical fitness results.

As for the benefits of the respiratory system, intradialytic physiotherapy when performed with a more specific therapeutic proposal for this aspect, such as Inspiratory Musculature Training (IMT), results in positive effects on exercise tolerance, increase in maximum inspiratory pressure and lung capacity, which have a positive impact on other physical and functional aspects, as suggested by studies by Dipp et al. (2020), Hargrove et al. (2021) and Silva et al. (2021).

CONCLUSION

The purpose of this study was to investigate the possible contributions of physiotherapy on the effectsconsequentof hemodialysis in patients withchronic kidney disease, and fromFrom the results, it can be inferred that CKD has deleterious effects on several systems of the body, with great repercussions on the musculoskeletal, cardiovascular and respiratory systems, due to the long period of inactivity during hemodialysis sessions.

Based on the above, it is possible to state that physical exercise has the potential to act in a preventive way and also to delay the disorders resulting fromkidney disease, it has been an effectively used tool to fight sedentary lifestyle and, thus, improve the muscle strength of patients with CKD during hemodialysis, which can expand the field of action for the physiotherapist.

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