Occupational therapy for individuals with chronic kidney disease undergoing renal rehabilitation: A literature review

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Abstract

Chronic kidney disease is a life-changing condition affecting 10% of the global population, leading to significant health challenges in a person's daily life. It is considered a worldwide health crisis due to its increasing prevalence in the general population and the development of complicated clinical symptoms if left untreated. Hemodialysis is a treatment procedure that helps substitute renal function, which is vital for the individual's health. Most health-related scientific literature focuses on understanding the underlying mechanisms of the disease, advancing hemodialysis treatment, and minimizing adverse side effects. Meanwhile, another scientific direction aims to evaluate the functioning and quality of life of these individuals, who can, in some cases, become extremely debilitated. People with chronic kidney disease undergoing hemodialysis often experience a significant disruption in their ability and efficiency to perform meaningful tasks and established routines independently. Occupational therapy can help empower individuals with chronic kidney disease undergoing hemodialysis, enabling life participation while minimizing the burden and health-related consequences of the disease.

Keywords: chronic kidney disease, hemodialysis, occupational therapy, activities of daily living.

Terapia ocupacional para indivíduos com doença renal crônica submetidos à reabilitação renal: Uma revisão da literatura

Resumo

A doença renal crônica é uma condição que muda a vida e afeta 10% da população global, levando a desafios de saúde significativos na vida diária de uma pessoa. Ela é considerada uma crise de saúde mundial devido à sua crescente prevalência na população em geral e ao desenvolvimento de sintomas clínicos complicados se não for tratada. A hemodiálise é um procedimento de tratamento que ajuda a substituir a função renal, que é vital para a saúde do indivíduo. A maior parte da literatura científica relacionada à saúde se concentra na compreensão dos mecanismos subjacentes da doença, no avanço do tratamento de hemodiálise e na minimização dos efeitos colaterais adversos. Enquanto isso, outra direção científica visa avaliar o funcionamento e a qualidade de vida desses indivíduos, que podem, em alguns casos, ficar extremamente debilitados. Pessoas com doença renal crônica submetidas à hemodiálise geralmente sofrem uma interrupção significativa em sua capacidade e eficiência para realizar tarefas significativas e rotinas estabelecidas de forma independente. A terapia ocupacional pode ajudar a capacitar os indivíduos com doença renal crônica submetidos à hemodiálise, permitindo a participação na vida e minimizando a carga e as consequências da doença relacionadas à saúde.

Palavras-chave: doença renal crônica, hemodiálise, terapia ocupacional, atividades da vida diária

1. Introduction

Chronic Kidney Disease (CKD) is defined as a progressive, irreversible disorder of renal function that leads to a series of biochemical, clinical, and metabolic changes directly related to increased morbidity and mortality (World Health Organization, 2019). Depending on the extend of renal damage, CKD is categorized in 5 stages. Many people with CKD in the early 3 stages experience mild symptoms until reaching the advanced stages of the disease

(4 and 5) where they undergo hemodialysis (HD), which is the international gold standard for medical care to replace renal function (National Kidney Foundation, 2023). People with HD experience various challenges related to the symptoms of the disease or HD, such as physical and cognitive decline, strict dietary restrictions, complications from the arteriovenous fistula, and sleep and mood disorders (Jesus et al., 2019; Chang et al., 2020; Voltarelli; Ruzzi-Pereira, 2021). Disability in individuals with CKD and end-stage renal disease (ESRD) is often characterized by diminished physical capacity, frailty, and cognitive decline.

With advancements in medical care for individuals with chronic conditions, such as ESRD, patients are experiencing not only longer life expectancy but also extended periods of illness and treatment (Himmelfarb et al., 2020). It has become increasingly important for healthcare professionals to focus on patients' physical, psychological, and social functioning, as well as their perceptions of life satisfaction and overall well-being (Kalsoom et al., 2020).

Systematic reviews and meta-analyses have previously demonstrated that exercise enhances aerobic capacity, muscular functioning, cardiovascular health, walking ability, and health-related quality of life (HRQOL) in CKD patients undergoing HD (Nakamura et al., 2020; Villanego et al., 2020; Wu et al., 2020). Furthermore, recent studies indicate that increased physical activity is linked to improved survival rates and reduced mortality (Martins et al., 2021; Morishita et al., 2017). However, there have been very few studies on the role of occupational therapy for individuals with CKD undergoing HD treatment and its effectiveness in promoting independence and functioning in activities of daily living (ADL).

This review aims to explore the obstacles that people with CKD on HD face in their everyday lives and, in addition, to ascertain the way that their occupational performance (ability to participate in meaningful everyday tasks) (OP) is impacted as well as in what way it can be empowered by the help of occupational therapists.

2. Materials and Methods

2.1 Systematic review

A literature search was performed for the keywords “Chronic Kidney Disease”, “Occupational Therapy”, “Occupational Performance”, “Activities of Daily Living”, “Instrumental Activities of Daily Living”, and “Hemodialysis” in PubMed, ScienceDirect, and CINAHL databases. The inclusion criteria of the articles retrieved were the following: 1) studies from 2014 to present 2) articles written in English 3) studies with adults as a sample with CKD undergoing HD treatment. In addition, a snowball search method carried out by tracking down related works by using the bibliography or reference list at the end of an article.

In this literature review, 167 articles were identified via database and citation searches. After reviewing the titles and abstracts, a total of 61 studies were included. The reviewed articles included reports of difficulties in occupational domains of performance, especially in Activities of Daily Living and the contribution of occupational therapy to the Renal Rehabilitation multidisciplinary team.

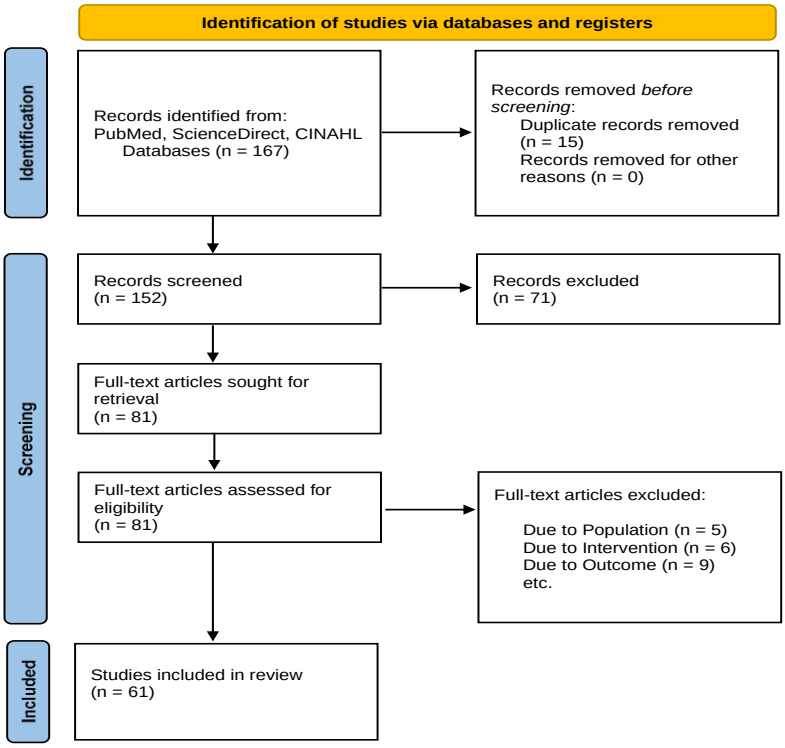

Figure 1. Flow Diagram for article selection by Tricco et al. (2018).

3. Activities of Daily Living of Persons with Chronic Kidney Disease undergoing Hemodialysis

Multiple studies show that people starting HD undergo a substantial decline in ADL (Kasbia et al., 2014; Kutner et al., 2015; Matsuzawa et al., 2019). People with CKD undergo a multitude of physical, mental, and psychological changes that limit their ability to participate in occupational performance areas, negatively affecting their functioning and quality of life (Anderton et al., 2015; Fang et al., 2020; Pretto et al., 2020). Specifically, the physical symptoms and the possible mild cognitive impairment (MCI) due to CKD and HD, negatively affect individuals' ability to participate in work environments, ADLs, and leisure activities (Viggiano et al., 2019, Liu et al., 2021, Rani; Kalia, 2022).

Studies on the prevalence of cognitive decline in people undergoing dialysis report an increased risk of developing MCI, with prevalence rates ranging from 27% to 62%, and 5% to 10% of these cases progressing to clinical dementia (Burns et al., 2017, Brodski et al., 2019; Otobe et al., 2019; Xu et al., 2021). At the same time, the progression of CKD to ESRD negatively affects the physical health of individuals, as they experience difficulties in performing basic activities of daily living (BADLs) and instrumental activities of daily living (IADLs) (Viswanath et al., 2019).

As a result of the decreased functioning and independence, people with HD are at high risk of partial or complete dependence on a caregiver, regardless of their age (Chu et al., 2019). At least 20% of people on dialysis report needing assistance with at least one BADLs such as feeding, dressing, and self-care, while 80% of people with significant kidney function problems report needing assistance with IADLs such as using the telephone, shopping, cooking, washing, moving around the community and managing medication and finances (Chu et al., 2019; Mollaoğlu; Başer, 2021; Rani; Kalia, 2022). Additionally, physical symptoms and MCI can significantly affect individuals' productivity and work engagement.

Studies investigating the impact of the disease on productivity report that people with CKD on HD are more often absent from work (absenteeism), have reduced productivity (presenteeism), or withdraw from the workforce altogether (van Haalen et al., 2020; de Vries et al., 2021; Savira et al., 2021). Meanwhile, only 26% of individuals maintain employment and 36% retire early (Kirkeskov et al., 2021). The engagement of people in HD in leisure activities is likely to be significantly hindered by the severity of symptoms and treatment (McQuoid, 2017; Yamamoto et al., 2021). In particular, moderate or vigorous physical activity, systematic pursuits such as sports, and other organized activities such as travel and long-distance commuting are significantly limited or likely to

become impractical due to symptoms and the binding HD frequency of treatment (Rosa et al., 2015; Warsame et al., 2018; Yamamoto et al., 2021). In addition, people on HD face practical difficulties transporting independently to the community or the hospital renal unit for scheduled treatments.

Access to reliable transportation is vital for keeping up with dialysis appointments and adherence to in-center HD treatments for dialysis patients. (Varghese, 2019). Specifically, they usually experience physical side effects from the disease or the HD treatment, including nausea, dizziness, leg weakness or numbness, low blood sugar, post-dialysis fatigue, and sleepiness, which have a direct impact on their ability to drive with safety, limiting their independence (Graver et al., 2021). According to Varela et al. (2015), 15% of people with CKD undergoing HD treatment who experience MCI reported being in a motor vehicle accident. As a result, those difficulties and safety concerns pose a direct personal and financial impact on the individuals or their caregivers, who bear the costs themselves or the costs of moving the individual with CKD with their means of transport (Lewis et al., 2023). Lastly, people with HD are vulnerable to developing sleep disorders, with studies reporting that 59% to 68% experience symptoms of insomnia and poor sleep quality (Hamzi et al., 2017; Tan et al., 2022). As a result, chronic fatigue and lower quality of life problems are observed, which accelerate the progression of the disease and increase the risk of mortality (Lu et al., 2018).

4. The role of Occupational Therapy in Renal Rehabilitation

4.1. Evidence-based Renal Rehabilitation treatments in hospital settings

Renal Rehabilitation (RR) encompasses a comprehensive and coordinated approach aimed at enhancing the physical, psychological, and social well-being of people with renal failure (Goto, 2017; Kohzuki, 2024). Central to this approach is exercise training or intervention, which seeks to boost physical activity, improve poor physical functioning and frailty, and potentially enhance survival rates in individuals with chronic kidney disease (CKD) (Clarkson et al., 2019; Nakamura et al., 2020; Villanego et al., 2020; Wu et al., 2020). While exercise interventions have been shown to improve physical function outcomes across various stages of CKD, including for those undergoing hemodialysis (HD), individuals on HD encounter different challenges to engaging in exercise than those with predialysis CKD (Sheshadri; Johansen, 2017). Initiating rehabilitation in the earlier stages of CKD, or prehabilitation before HD begins, may offer more advantages compared to waiting until physical functioning declines significantly and patients commence dialysis (Castle et al., 2023).

Recent epidemiologic data indicates that the overall number of patients with HD is steadily increasing, particularly among elderly people over 75 years old (Goto, 2017; Kovesdy, 2022). As the number of elderly people with HD increases, it is important to maintain appropriate physical activity to prevent decreases in physical function and ADL independence caused by disuse in daily life (Angulo et al., 2020). Additionally, elderly people undergoing HD typically exhibit low participation in social activities and tend to remain indoors, which further diminishes their physical activity and, consequently, their occupational performance (Shiota; Hashimoto, 2016).

Both the quantity and intensity of physical activity are crucial (Moorthi & Latham-Mintus, 2019; Slaven et al., 2021). However, few studies have addressed the level of everyday activities that people on HD are engaged in or their attitudes toward exercise and their state of psychological preparedness (Goto, 2017). Individuals with CKD and ESRD present with many health problems, which may lead to increased mortality and dysfunction. They frequently experience a range of comorbidities that contribute to physical, emotional, and social challenges, ultimately diminishing their health-related quality of life (HRQOL) (Cha & Han, 2020; MacRae et al., 2020). Difficulties in ambulation, balance issues, joint pain and stiffness, muscle spasms and weakness, fatigue, neuropathy, and challenges with ADLs can significantly reduce functional independence (Watanabe et al., 2018). RR aims to restore physical functioning, facilitate independence in ADLs, and promote functional independence by using various therapeutic interventions (Mayes et al., 2023).

Specifically, occupational therapy (OT) stands out as the health profession that empowers individuals across their lifespan to engage in meaningful activities through therapeutic interventions (occupations)(WFOT, 2018). OT enables individuals to maximize their quality of life by promoting ADLs and IADLs and supporting them in managing or preventing injury, illness, or disability. Despite this potential, research on the impact of OT specifically in people with CKD remains limited, with Watanabe et al. (2016) reporting improved ADL scores following OT interventions. Decreased physical and cognitive function significantly contribute to ADL difficulties in individuals undergoing HD (Bronas et al., 2017; Fotaraki et al., 2022). Targeted, individualized care that addresses these challenges is crucial for HD patients experiencing ADL limitations (Voltarelli; Ruzzi-Pereira, 2021). Comprehensive strategies, including collaborative interventions by rehabilitation specialists, can effectively enhance ADL levels among dialysis patients. Occupational therapists play a pivotal role not only in

improving ADLs and IADLs but also in enhancing the health-related quality of life (HRQOL) for CKD patients (Endo et al., 2017).

4.2. The role of occupational therapy in renal rehabilitation

The concepts of functioning and quality of life are directly related to the ability to perform meaningful tasks across different conditions and environments. The capacity to perform occupations is recognized as pivotal for both physical and mental well-being (World Health Organization, 2019). According to the American Occupational Therapy Association, human occupations encompass activities such as activities of daily living; instrumental activities of daily living; rest and sleep; work; play and leisure; education; social participation, and health management (AOTA, 2020).

OT is a health profession that utilizes daily activities (occupations) therapeutically to assist individuals in achieving their desired and necessary tasks, with a focus on enhancing occupational performance (OP)(American Occupational Therapy Association, 2020). Occupational Performance (OP) refers to the ability to perform tasks that facilitate the fulfillment of occupational and social roles satisfactorily, for the individual's stage of development, culture, and environment (Law et al., 2015). In renal rehabilitation units, OT intervention represents a novel approach aimed at enhancing quality of life. According to the American Occupational Therapy Association, OT practitioners are adeptly trained to assess limitations stemming from chronic illnesses that impact an individual's ability to perform and participate in occupational performance domains such as productivity/work, leisure activities, and their activities of daily living while educating the individual about the importance of health management (ADL)(Lambdin-Pattavina; Pyatak, 2022).

Specifically, health management refers to activities related to developing, managing, and maintaining health and wellness routines, including self-management, to improve health to support participation in other occupations. This involves communication with the health care system and the physician about prescriptions, medication management, interpreting medication instructions, taking medications on a routine basis and refilling prescriptions in a timely manner (Schwartz; Smith, 2017). Furthermore, physical activity and nutrition management are the backbone of a health-promoting lifestyle, which involves completing cardiovascular exercise, strength training, and balance training to improve or maintain health and decrease the risk of health episodes, such as by incorporating walks into daily routine, while implementing and adhering to nutrition and hydration recommendations from the medical team, preparing meals and participating in health-promoting diet routines to support health goals. However, the integration of OT practices in hospitals and primary health care often lacks a comprehensive understanding of the specific needs for functional independence among individuals with CKD.

The occupational performance of people with CKD undergoing HD treatment can change drastically. It is essential to address these changes in OP, to evaluate the individual’s willingness and ability to perform occupations in different settings. The Canadian Occupational Performance Measure (COPM) is an evidence-based assessment measure designed to detect changes in the individual’s perception of their OP over time. This tool categorizes occupations into self-care (personal care, functional mobility, and functioning in the community); productivity (paid or unpaid work, handling household chores, school, and playing); leisure (quiet recreation, active recreation, and socialization) (Donnelly et al., 2017).

COPM focuses on the needs and problems of individuals and is not specific to any health condition, aiming to establish and plan treatment and measure progress (Vyslysel et al., 2021). Meanwhile, occupational therapists often substantiate their theoretical and clinical reasoning through well-based and researched model theories. The Model of Human Occupation (MOHO) is a body of theory that explains some aspects of human behavior addressed in occupational therapy practice and provides tools to apply that theory in practice (Kielhofner, 2008). MOHO seeks to explain how occupation is motivated, patterned, and performed. Within MOHO, humans are conceptualized as comprising three interrelated components: volition, habituation, and performance capacity. Volition refers to the motivation for occupation, habituation refers to the process by which occupation is organized into patterns or routines, and performance capacity refers to the physical and mental abilities that underlie skilled occupational performance.

MOHO also emphasizes that understanding human occupation requires an understanding of the physical and social environments in which it occurs. Thus, this model aims to understand occupation and problems of occupation that occur in terms of its primary concepts of volition, habituation, performance capacity, and environmental context. MOHO is intended for use with any person experiencing problems in their occupational life and is designed to be applicable across the lifespan. For example, MOHO has been applied with such diverse groups as adults with chronic pain, children with attention deficit hyperactivity disorder, persons with traumatic brain injury, older

persons with dementia, persons living with AIDS, and adolescents with mental illness. MOHO is also used in a variety of contexts, including hospitals, outpatient clinics, residential facilities, nursing homes, rehabilitation programs, work programs, prisons and correctional settings, and community-based organizations. Persons with CKD experience vast changes regarding volition, habituation, and performance capacity in occupational performance domains. The complex physical symptoms of CKD and side effects of HD can negatively affect a person's will and ability to participate in essential activities of daily living, social settings, work environments, and leisure activities.

A study using the functional independence measure (FIM) found that over 80% of people on HD could perform basic ADLs independently, but certain specific tasks such as climbing stairs and other domains such as comprehension and memory were compromised (Viswanath et al., 2019). Watanabe et al (2018) found that people undergoing HD have a significantly higher ADL difficulty, compared to healthy controls. Additionally, the difficulty in performing ADL was independently associated with age, presence of depressive symptoms (inability to bathe, eat, dress, transfer from bed to a chair, self-care tasks or walking), social isolation, and general physical ability (e.g. walking speed, leg strength).

According to Matsuzawa et al. (2019), 20% of people with ESRD undergoing HD treatment, who were free of ADL disabilities at baseline, exhibited a decline in functional status during a one-year observation period, which was strongly associated with poor health and quality of life prognosis. Another study administering the Canadian Occupational Performance Measure showed a reduction of occupational performance in people with CKD on peritoneal dialysis. Specifically, there was a reduction in the efficiency of the performance of women's household activities after the start of treatment (Voltarelli & Ruzzi-Pereira, 2021). Furthermore, HD did not impact the participant's ability to perform personal care tasks independently. According to COPM, 12 respondents rated the importance of independently managing clothing, food, and personal hygiene as a 10 on a scale from zero to 10.

Participants with secondary chronic conditions, such as hypertension and diabetes, reported experiencing difficulties, though these issues were not attributed to HD. Women in particular were heavily involved with complex tasks of daily living, such as taking care of family members, meal preparation, and general household care. The change in the occupational performance of these women was due to the difficulty in performing daily tasks, such as picking up heavy objects, in addition to feelings of weakness and tiredness that HD generates and the necessary care with the fistula, making it difficult to perform fully independent household tasks that required strength and endurance.

In the study of Pereira et al. (2018), occupational therapists frequently employed adaptations and ADLs to identify difficulties and opportunities for facilitating occupational performance. This study observed that due to decreased participation in ADL, individuals with CKD on HD performed the ADLs either exclusively or with significant assistance from the caregiver/family member. This occurred as a protective measure by the caregiver/family members, who often restricted the individual's participation in self-care activities due to their physical decline, feeling of malaise, and frequent tiredness resulting from the disease.

Occupational therapists aim to optimize the performance skills required for self-care activities by encouraging active participation and, when necessary, introducing resources or materials to adapt or simplify tasks. The therapeutic use of occupations to improve and maintain OP in self-care activities was also used by the occupational therapists to enhance the sense of competence and self-esteem. The study results indicated that the performance and adequacy of the activities promoted greater independence and encouraged users to utilize their potential more effectively. Furthermore, they used different strategies and interventions 'to facilitate the individual's performance, such as energy conservation techniques, assistive technology, activities to stimulate body awareness, motor coordination activities, as well as guidance to assist and graduate the assistance by caregivers/family members.

Social isolation can occur due to the care provided by the treatment, including a strict diet, the use of highly complex medications, and adaptation to a new routine, which distances adolescents from their social groups (Puchulu et al., 2023). Older adults are at a high risk of social isolation as they may gradually become separated from their social network due to factors such as retirement, disease, and reduced family size (Cotterell et al., 2018; Moreno-Tamayo et al., 2019). Extensive evidence suggests that social isolation leads to a lower quality of life, a higher incidence of several psychological and physical diseases and increased tobacco use, poorer nutrition and less physical activity, ADL dependence, and cognitive decline (Kobayashi; Steptoe, 2018; Yu et al., 2021).

5. Conclusions

The transition from a life centered around family, work, and personal autonomy to one dominated by the hospital

and medical-related equipment marks a significant turning point for the individual. They must adhere to an institutional framework that manages their illness, dictates the frequency of hemodialysis treatments, schedules meals, imposes activity restrictions, and limits social interactions. This disruption leads to reduced efficiency in their long-established daily routines, resulting in diminished quality of life. Occupational therapy offers a pathway to empower individuals with chronic kidney disease undergoing hemodialysis, allowing them to enable life participation while minimizing the burden and health-related consequences of the disease. Through tailored interventions, occupational therapy can help restore a sense of autonomy and improve the overall well-being of the individuals.

6. Author's Contributions

Nikolaos Gerosideris: conceived the study and reviewed literature, collected data, synthesized and wrote the first draft of the manuscript. *Christina Ouzouni*: synthesized and reviewed the first draft of the manuscript. Symeon *Dimitrios Daskalou*: collected data, synthesized it, and wrote the first draft of the manuscript. *Pinelopi Vlotinou*: synthesized and reviewed the first draft of the manuscript. *Ioanna Giannoula Katsouri*: conceived the study, reviewed literature, collected data, synthesized and reviewed the first draft of the manuscript. All authors reviewed, edited, and approve the final version of the manuscript.

7. Conflicts of Interest

No conflicts of interest

8. Ethics Approval

Not applicable

9. References

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