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Original Research

Role of Physiotherapy in Improving the Quality of Life of Dialysis Patients: Assessment of Functional Outcomes and Laboratory Biomarkers

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ABSTRACT:

The present study was conducted to determine the effect of the Exercise on the renal dialysis patient and their life. Sixty dialysis patients participated in this study; their age ranged from 30 to 60 years. All subjects participated in the study received the treatment program three times per week and were evaluated before and after eight weeks of the treatment program. The results obtained revealed significant differences of all measured variables; blood analysis,

six minutes walking distance test, modified borg scale, short form 36 quality of life questionnaire (SF-36). A statistically significant difference was also found in improvements in physical function. Incorporating aerobic, resistance, and flexibility exercises into routine hemodialysis care is vital for reducing physical deconditioning, enhancing overall health outcomes, and improving performance in activities of daily life. Further studies are requirements to confirm this finding.

KEYWORDS: Dialysis Patient, Physiotherapy, Tobruk, Libya.

INTRODUCTION

Chronic renal failure, kidney injury accompanied by a progressive and irreversible loss of renal function, is an important medical and public health problem today as it is associated with high morbidity and mortality rates, often leading to disability and a significant decrease in quality of life.[1 (Al-Debei, I. A. 2013). Hemodialysis patients often face physical and psychological challenges that reduce their quality of life. Aerobic exercise has been shown to improve physical endurance, cardiopulmonary function, and social well-being in this population confirmed these benefits, supporting the integration of exercise into routine dialysis care (Alkhaqani, A. L. 2022). Acute and chronic types of kidney failure can both occur, each with different causes. Acute kidney failure can be caused by underlying conditions such as hypotension, urinary tract blockage, some drugs, muscle damage, and hemolytic uremic syndrome Chronic kidney failure is often linked to conditions such as long-standing diabetes, hypertension, nephrotic syndrome, and polycystic kidney disease (Bohol, G. F. C., et al. 2024). Kidney failure, also known as end-stage renal disease (ESRD), is most often the result of chronic kidney disease (CKD) progressing over time. Several well-established risk factors significantly increase the likelihood of developing kidney failure: obesity, heart diseases, high blood pressure, old age, diabetes, family history and medical conditions (Kazancioğlu R. 2013). Dialysis is a medical treatment for renal failure in which a machine filters waste and extra fluid from the blood to replace the kidneys. Due to the nature of the treatment, dialysis patients frequently face psychological and physical difficulties, such as joint stiffness, weariness, and muscle weakness. (National Kidney Foundation. 2020). Key recent advances in exercise studies have focused on the efficacy of novel intervention strategies across the CKD spectrum. These include high-intensity interval training, virtual reality gaming, intradialytic yoga, electrical stimulation of muscles, blood flow restriction training, and protocols combining exercise with nutritional supplementation. Research is also beginning to explore the role of prehabilitation for patients prior to dialysis and kidney transplantation (Beetham, K. S., rt al 2019) many dialysis patients undergo multidrug therapy. The complexity of multidrug therapy in dialysis patients makes them aware of the high risk of adverse events, which leads to

subsequent non-compliance. Medication non-compliance averts patients from gaining the full benefit of the prescribed medications and is associated with increased mortality and hospitalizations (Luttropp, K., et al. 2009). Therefore, compliance with drug therapy is a key element in the effective management of hemodialysis patients. Several studies have focused on the medication management situation of hemodialysis patients, especially their medication adherence(Luttropp, K., et al. 2009).

Patients with chronic kidney disease receiving hemodialysis are frequently burdened by fatigue, muscle atrophy, and cardiovascular complications, which contribute to diminished physical capacity and overall quality of life. These impairments often result from the combined effects of the underlying disease and the hemodialysis treatment (Alkhaqani, A. L. 2022). Physiotherapy has been identified as an effective strategy to alleviate some of these adverse outcomes. Research indicates that resistance exercises performed during dialysis sessions improve patients' endurance and functional status, as demonstrated by enhanced performance in the six-minute walk test (6MWT) and improved scores on quality-of-life assessments (Alkhaqani, A. L. 2022).

Rasyid, H., et al. (2022) One critical yet often overlooked complication in this population is impaired balance, which increases the risk of falls and associated morbidity. Hemodialysis patients frequently suffer from postural instability due to muscle weakness, peripheral neuropathy, and vascular factors related to uremia and dialysis treatment. This imbalance exacerbates functional limitations and may lead to serious injuries, further compromising patients' independence and quality of life. Incorporating balance training into physiotherapy programs is therefore essential to reduce fall risk and improve overall safety. (Rasyid, H., et al. 2022).

Toulabi & Kalaveh, (2016) Despite growing evidence supporting physiotherapy, rehabilitation programs are not uniformly integrated into patient care worldwide. This gap is attributed to factors including healthcare infrastructure limitations and lack of standardized protocols. Such inconsistencies hinder the systematic provision of rehabilitation services and the realization of their full benefits (Toulabi, T., et al. 2016). Suliman, S. I., et al. Physiotherapy at played an important role in recovering patients in a short time and returning to daily activities (Suliman, S. I., et al. 2024).

Suliman, S. I., et al. Patients were satisfied with the physcial therapy and confirmed that they are more

comfortable after the physiotherapy (Souliman, S. I., et al. 2019).

The aim of the study was to determine the effect of exercise on the quality of life in hemodialysis patients.

MATERIALS AND METHODS

This study was conducted on dialysis patients and the role of physiotherapy in improving the quality of the patients. The cases were collected from the medical methods of dialysis department of Tobruk Medical Center between December 2024 to February 2025. The types of dialysis of patients and the causes of the disease were identified and advanced during the issue we presented to the patients.

The total number of cases at the Tobruk Medical Center, which they are residing with

dialysis, was about 150 cases taken about 60 for this study by age, sex, disease history and symptoms.

Most patients had limb numbness, difficulty moving and inability to perform normally in daily activities.

Criteria for Selection/ Inclusion Criteria: Sixty dialysis patients undergo treatment sixty (age between 30 to 60 years), All participants would be clinically and medically stable, physically active (moderate). Exclusion Criteria: Sever Musculoskeletal Disorder, Uncontrolled Hypertension, Complex Ventricular Arrhythmia or Heart Block, Recent Myocardial Infarction and Uncontrolled Diabetes Mellitus.

Before enrolling a patient with kidney disease in a physical therapy regimen, it is essential to assess their overall health and stability through a series of laboratory tests pre and post exercise. These tests help in identifying potential risks, monitoring disease progression, and ensuring the safety and effectiveness of the proposed therapeutic interventions such as Serum Albumin, Urinalysis, HbA1c, Cholesterol, LDL, HDL, Triglycerides and Phosphorus

Short form 36 quality of life questionnaire (SF-36) It was used with kidney disease patients to assess their physical, emotional, and social well-being. It helps measure the impact of the disease and treatment on the patient's overall quality of life, enabling better management and personalized care plans.

Physical therapy: The Six-Minute Walk Test (6MWT) is a widely used tool to assess a patient's functional capacity, particularly for evaluating aerobic endurance, mobility, and overall fitness. It was used to evaluate the degree of respiratory discomfort in terms of determinations of subjective rates, according to the perception of the individual. This is a vertical scale quantified from 0 to 10, in which 0 represents no symptoms and 10 represents maximum symptoms, providing an individual measurement of the intensity of the exercise.

Aerobic exercises, such as light leg and arm movements performed in bed, help improve peripheral circulation, enhance cardiac output, and mitigate post-dialysis fatigue.

Resistance exercises, including bed-based knee extensions and leg slides, target major muscle groups to preserve strength and prevent atrophy commonly associated with physical inactivity in CKD.

Flexibility exercises, such as shoulder shrugs and passive stretching, aim to maintain joint range of motion and reduce musculoskeletal stiffness, which frequently results from prolonged immobility during dialysis sessions.

These exercises are designed to be low-impact and can be safely performed in bed immediately following dialysis. This approach allows patients to engage in physical activity without undue strain, facilitating a smoother transition into recovery while minimizing potential complications. Hydrotherapy with exercises are considered an effective and safe option for dialysis patients, as they contribute to improving physical fitness, strengthening muscles, and relieving joint pain, without causing excessive stress to the body.

Statistical analysis: IBM SPSS Statistics 25.0 program was used to analyze data.

RESULTS AND DISCUSSION

Sixty patients (age range 30–60 years) undergoing hemodialysis participated in this study. All subjects engaged in an exercise program conducted three times per week over eight weeks. Physical performance was assessed using the Six-Minute Walk Test (6MWT), and perceived exertion was measured by the Modified Borg Scale. Quality of life was evaluated with the SF-36 questionnaire. Blood parameters including

hemoglobin levels were also monitored. Measurements were taken before and after the intervention as figure 1. Statistical analysis was performed using paired t-tests with significance set at $p < 0.05$.as Table

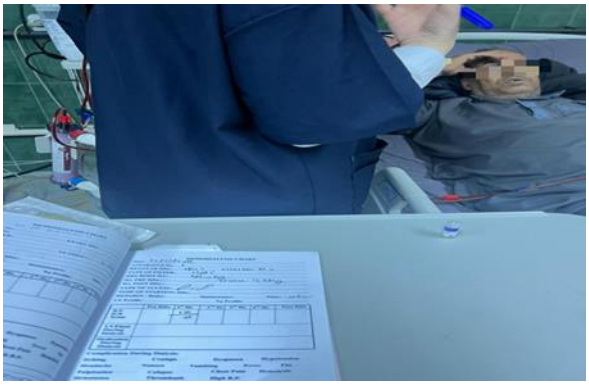

Figure: (1). . patients evaluated pre and post exercise

Table:(1). defferent varaiable for patien pre and post exercise

Variable	Pre-intervention Mean ± SD	Post intervention Mean ± SD	p-value
Six-MinuteWalk Test(6MWT) (meters)	320.5 ± 50.2	375.8 ± 55.4	
Modifine Borg Scale (0–10)	6.8 ± 1.2	4.3 ± 1.1	< 0.001
SF-36Physical Function Score (0–36)	48.6 ± 12.5	63.2 ± 14.0	< 0.001
SF-36 Overall Quality of Life Score (0–36)	52.0 ± 11.3	67.4 ± 13.2	< 0.001
Hemoglobin level (g/dL)	10.2 ± 1.0	10.8 ± 1.1	0.02

Pre and post treatment : The average distance covered by the patients in the Six-Minute Walk Test significantly increased from 320.5 meters Pre: before the exercise program to 375.8 meters Post: after completion ($p < 0.001$). This improvement indicates enhanced aerobic capacity and endurance as a direct effect of the 8-week exercise intervention, with an approximate increase of 17.25% in walking distance as figure 2.

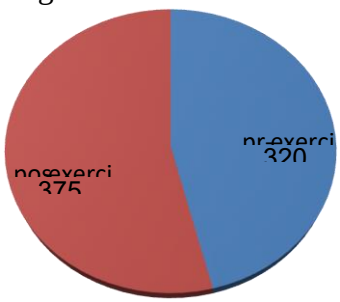

Figure: (2). Six-Minute Walk Test (6MWT) Pre and post treatment(exercise).

Modified Borg Scale Score :Pre and Post treatment(exercise):The perceived exertion measured by the Modified Borg Scale decreased significantly from an average of 6.8 Pre: before the intervention to 4.3 post-intervention ($p < 0.001$). This reduction reflects a decrease in subjective fatigue and improved exercise tolerance among patients, with an approximate 36.76% reduction in perceived exertion, as figure 3.

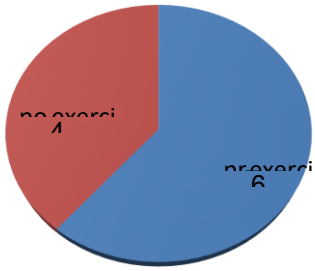

Figure: (3). Six-Minute Walk Test (6MWT) Pre and post treatment(exercise).

SF-36 Physical Function Score :Pre and Post treatment (exercise);The SF-36 Physical Function subscale scores showed a significant increase from 48.6 pre-exercise to 63.2 post-

exercise ($p < 0.001$), indicating an improvement in patients' physical health status and quality of life following the exercise program, with an approximate 30.04% improvement in physical function as figure 4.

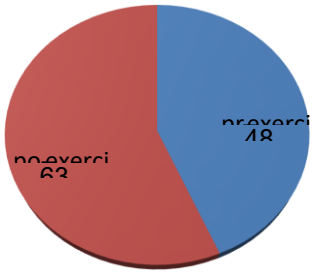

Figure: (3). SF-36 Physical Function Scores Pre and Post (Exercise).

National Kidney Foundation. (2020) Dialysis patients frequently suffer from fatigue and muscle weakness, problems that can be exacerbated by the process itself as well as other medical conditions. These disorders can negatively affect a patient's overall quality of life, significantly impairing their ability to perform daily activities (National Kidney Foundation. 2020). that agreement with this study.

Alkhaqani, A. L. (2022) Hemodialysis patients often face physical and psychological challenges that reduce their quality of life. Aerobic exercise has been shown to improve physical endurance, cardiopulmonary function, and social well-being in this population confirmed these benefits, supporting the integration of exercise into routine dialysis care (Alkhaqani, A. L. 2022). this agrees with our study.

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Suliman, S. I., et al. Patients were satisfied with the physical therapy and confirmed that they are more comfortable after the physiotherapy especially hydrotherapy (Suliman, S. I., et al. 2019) this agreement with this study.

CONCLUSION

Integrating aerobic, resistance, and flexibility exercises into the routine care of hemodialysis patients is essential for mitigating the adverse effects of physical deconditioning and improving overall health outcomes. Post-dialysis out-of-bed exercises represent a safe and effective strategy to enhance functional capacity, preserve independence, and elevate quality of life for this vulnerable population. Aerobic exercises improve cardiovascular health, resistance training strengthens muscles, and flexibility exercises help maintain joint mobility—all of which contribute to better kidney function, reduced fatigue, and improved overall well-being.

The implementation of an exercise program should be individualized, taking into consideration the patient's specific medical conditions, physical limitations, and dialysis-related symptoms. Clinical supervision and regular monitoring are crucial for ensuring the safe and sustainable practice of these exercises. It is important to start slow, progressively increase intensity, and remain mindful of the body's response to exercise. Staying hydrated and listening to one's body are vital components of the exercise routine to prevent overexertion. By incorporating regular physical activity, hemodialysis patients can significantly improve both their physical and mental health, supporting long-term kidney function and enhancing their quality of life. Further studies

are needed to confirm this study.

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ETHICS

Declare conflicts of interest or state "The authors declare no conflicts of interest." All information collect by Tobruk university's authors from medical Tobruk center

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الملخص

أُجريت هذه الدراسة لتحديد تأثير التمارين الرياضية على مرضى الغسيل الكلوي وحياتهم اليومية. شارك في هذه الدراسة ستون مريضًا يخضعون للغسيل الكلوي، تراوحت أعمارهم بين 30 و60 عامًا. تلقى جميع المشاركين في الدراسة برنامجًا علاجيًا ثلاث مرات في الأسبوع، وتم تقييمهم قبل وبعد مرور ثمانية أسابيع على البرنامج العلاجي. أظهرت النتائج المحصّلة فروقًا ذات دلالة إحصائية في جميع المتغيرات المقاسة، والتي شملت تحليل الدم، واختبار مسافة المشي لمدة ست دقائق، ومقياس بورغ المعدّل، واستبيان نوعية الحياة (النموذج القصير SF-36). كما وُجد فرق إحصائي دالّ في تحسن الوظيفة البدنية . يُعد دمج التمارين الهوائية، وتمارين المقاومة، والمرونة في روتين رعاية مرضى الغسيل الكلوي أمرًا بالغ الأهمية للحد من التدهور البدني، وتحسين النتائج الصحية العامة، وتعزيز الأداء في الأنشطة اليومية. وهناك حاجة إلى المزيد من الدراسات لتأكيد هذه النتائج.

الكلمات المفتاحية: مرضى الغسيل الكلوي، العلاج الطبيعي، طبرق، ليبيا.