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Physical Activity Improves Kidney Function in CKD Patients; Improved Kidney Function Shortens Hospital Stays

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Background: Patients with chronic kidney disease (CKD) suffer diverse health complications. Participation in regular physical activity predicts improved outcomes in many clinical populations. Limited data support the effectiveness of physical activity as an adjunct intervention for CKD patients. However, isolated effects on estimated glomerular filtration rate (GFR), serum albumin, and length of hospital stay (LOS) remain undefined.

Methods: We analyzed 43 consecutively-admitted patients at a Midwestern hospital in 2018; all patients had a comprehensive metabolic panel, reported physical activity behavior, and had a diagnosis of CKD or end-stage renal disease (ESRD). Descriptive statistics characterized the study sample (means, standard deviations, categorical percentages). Independent-samples t-tests assessed differences between active and sedentary patients. We tested the effect of daily physical activity on GFR and serum albumin using linear regressions, holding constant liver function, use of dialysis, dyslipidemia, and kidney transplant status. We estimated the effect of GFR and serum albumin on hospital LOS using a negative binomial regression.

Results: Patients were 62.8±17.8 years old, 55.3% were male, 44.2% were physically active, 67.4% had a diagnosis of CKD, and 32.6% had ESRD. Mean GFR was 24.9±12.7 mL/min, serum albumin was 3.1±0.7 g/dL, and LOS was 5.8±6.1 days. Active patients had 30.7% higher GFR ($p=0.048$); they had higher serum albumin and shorter LOS but those differences did not reach significance. With confounders held constant, physical activity predicted an increase in GFR of 8.1 mL/min ($p=0.015$; 95% CI: 1.64-14.47) and an increase in albumin of 0.5 g/dL ($p=0.033$; 95% CI: 0.04-0.85). Each 1 g increase in albumin predicted a 39.9% shorter LOS ($p<0.001$; 95% CI of IRR: 0.46-0.79) and each 1 mL increase in GFR predicted a 1.6% shorter LOS ($p=0.023$; 95% CI of IRR: 0.97-1.00).

Conclusions: In our sample of patients with CKD or ESRD, regular engagement in physical activity associated with improved kidney function, as measured by GFR and serum albumin. In turn, improvement in these biomarkers predicted shorter hospital stays. Although patients with kidney disease represent a diverse population with varying physical capacities, encouraging activity where possible may lead to improved clinical outcomes.