

Effects of the structured physical activity program in kidney transplant recipients

Anna Masajtis-Zagajewska, Katarzyna Muras, Maciej Niewodniczy, Michał Nowicki
Department of Nephrology, Hypertension and Kidney Transplantation,
Medical University of Lodz, Poland

Sedentary lifestyle in patients at all stages of chronic kidney disease (CKD) including kidney transplant (KTx) recipients is related to worsened quality of life and may adversely affect survival. Thus, there is a need to identify an optimal strategy aimed at increasing physical activity in CKD patients.

Subject and methods

Study population included 25 clinically stable KTx recipients >12 months after transplantation and a reference group of 15 non-dialysis patients with CKD stage 3 or 4

Clinical and biochemical characteristics of the study groups at baseline

| | KTx patients (n=24) | CKD patients (n=15) | P - value |
|-----------------------------------|---------------------|---------------------|-----------|
| Age (years) | 47 ± 13 | 47 ± 9 | NS |
| BMI (kg/m ²) | 26±4 | 27±4 | NS |
| Creatinine (mg/dl) | 1.8±0.5 | 2.7±0.8 | <0.05 |
| eGFR (ml/min/1.73m ²) | 53±23 | 36±11 | <0.05 |
| Fasting glucose (mg/dl) | 90.5 ± 9.1 | 92.1 ± 8.9 | NS |
| Total Cholesterol (mg/dl) | 230.5 ± 45.1 | 261.3 ± 69.3 | NS |
| HDL-Cholesterol (mg/dl) | 50.6 ± 10.1 | 47.5 ± 14.1 | NS |
| LDL-Cholesterol (mg/dl) | 142.9 ± 32.5 | 143.8 ± 28.9 | NS |
| Triglycerides (mg/dl) | 200.4 ± 127.9 | 280.1 ± 152.5 | NS |
| Uric acid (mg/dl) | 7.2 ± 1.5 | 6.4 ± 1.6 | NS |
| Total protein (g/l) | 71.3 ± 5.4 | 8.7 ± 2.8 | < 0.05 |
| Albumin (g/l) | 42.9 ± 3.1 | 40.9 ± 3.6 | NS |
| SBP (mmHg) | 132 ± 12 | 132 ± 13 | NS |
| DBP (mmHg) | 76 ± 9 | 79 ± 9 | NS |

At the end of the study eGFR significantly increased in KTx patients (from 53±23 ml/min/1.73m² to 58±19 ml/min/1.73m², p<0.01). Plasma lipids decreased significantly in both groups as well as body mass. Systolic blood pressure decreased significantly only in KTx patients by mean 3 mmHg but diastolic blood pressure decreased in both groups (mean decrease 4 mmHg). Adipose tissue mass (from 40.8±1.6 to 38.5±10.3 kg, p=0.01), total body water (from 38±9.1 to 37.3±9.5 L, p=0.01) and fat tissue index (from 14.3±3.7 to 13.5±3.2 kg/m², p=0.009) decreased significantly only in KTx patients. Body cell mass decreased only in CKD patients (from 28.6±7.8 to 25.1± 6.7 kg, p=0.05). SF-36 total score decreased in both groups (from 47±4 to 42±3, p<0.001 and from 57±4 to 52±4, p=0.001, respectively) .

At baseline the assessments of the general and nutritional condition, anthropometry, body composition with impedance spectroscopy (Body Composition Monitor), and habitual physical activity for three days including a weekend day with 3-dimensional accelerometer were conducted. On the basis of the baseline assessment an individual structured program of increased physical activity was prepared. A repeated training and short message service with reminders about the benefits of physical activity were provided to all participants. All measurements were repeated 1 and 3 months after implementation of the physical activity program. In addition the participants completed SF-36 Questionnaire, McGill Pain Questionnaire SF-MPQ and International Physical Activity Questionnaire (IPAQ) at baseline and at the end of the study.

Results

Physical activity and energy expenditure significantly increased after 3 months in both KTx and CKD patients

| | KTx patients baseline | KTx patients after 3 months | p - value | CKD patients baseline | CKD patients after 3 months | p - value |
|---------------------------------------|-----------------------|-----------------------------|-----------|-----------------------|-----------------------------|-----------|
| Total energy expenditure [kcal/min] | 10791±2226 | 13468±3546 | <0.001 | 9073±3023 | 11540±2836 | <0.001 |
| Active energy expenditure [kcal/min] | 1793±1282 | 2665±1756 | <0.001 | 1426±1049 | 2168±1534 | 0.01 |
| Metabolic Equivalent [1kcal/kg-1xh-1] | 1.4 ± 0.2 | 2.1 ± 0.2 | <0.001 | 1.3 ± 0.2 | 1.7 ± 0.3 | <0.002 |
| Total number of steps | 4400 ± 2333 | 9093 ± 3049 | < 0.001 | 4091 ± 2128 | 7291 ± 2914 | <0.001 |
| Physical activity duration [min] | 126 ± 87 | 200 ± 132 | 0.001 | 79 ± 78 | 129 ± 114 | <0.001 |
| Resting time [min] | 564 ± 102 | 518 ± 95 | 0.01 | 559 ± 101 | 497 ± 86 | 0.003 |
| Sleep duration [min] | 370 ± 94 | 321 ± 81 | 0.02 | 402 ± 95 | 330 ± 73 | <0.001 |

Conclusion

Increased physical activity has beneficial effects on metabolic profile, body composition and quality of life in non-dialysis CKD patients and these benefits are even greater in KTx patients.

