

Higher physical activity levels before and after an episode of stage 3 AKI are associated with improved renal recovery

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Introduction

Acute kidney injury (AKI) is a known risk factor for the development of chronic kidney disease (CKD). Animal studies have demonstrated the potentially reno-protective effects of physical activity, both against the development of AKI and in promoting renal recovery. However, this has not been investigated in humans. The aim of the study was to investigate the association between physical activity levels and recovery in kidney function, measured by eGFR and creatinine, following an episode of stage 3 AKI.

Method

Twelve hospitalised participants with non-obstructive stage 3 AKI (as per KDIGO criteria) were asked to complete two questionnaires; the General Practitioner Physical Activity Questionnaire (GPPAQ), and the Duke Activity Status Index which provided measures of physical activity and functional capacity levels respectively. Baseline questionnaires were completed in hospital (as participants were asked to recall their physical activity and functional capacity levels before hospitalisation). Following discharge, the participants wore a pedometer for 7 consecutive days to ascertain their daily step count. Renal function was monitored by collecting eGFR and creatinine measurements. Measurements within the 12 months prior to admission were taken as baseline renal function and further readings 25 ± 46 days after discharge were used as an initial measure of renal recovery (referred to as recovered creatinine).

Results

Data from the 12 participants who provided step count information were analysed. At diagnosis of stage 3 AKI, participants had a mean creatinine of 547 ± 280 with their mean baseline and recovered creatinine as follows; 95 ± 35 and 172 ± 83 . There were positive associations between renal recovery and baseline physical activity levels measured using the GPPAQ ($r=0.55$, $p=0.06$) and functional capacity (0.17 , $p=0.6$), although not to statistical significance. A higher daily step count after discharge was associated with both a higher baseline eGFR ($r=0.73$, $p<0.01$) and significant improvements to their renal recovery ($r=0.69$, $p=0.01$). The participants were divided into two groups based on their recovered creatinine levels. Those who recovered renal function back to within 25% of baseline ($n=5$) had a higher mean step count compared to those whose renal recovery was less pronounced ($n=7$); (3712 ± 3960 vs 3334 ± 2254 , respectively).

Conclusion

Those with higher baseline and post discharge physical activity levels had greater improvements in their renal recovery following an episode of AKI. This suggests that higher levels of physical activity may be protective and promote recovery of renal function following an episode of AKI. Physical activity and exercise interventions should be tested in the AKI situation to see whether they are efficacious in promoting renal recovery.