

## CKD-PAQ: Developing a tool for physical activity estimation in chronic kidney disease

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### Background

Estimating physical activity is an essential component of the nutritional management of patients with kidney disease. In addition, more physically active patients may benefit from greater dialytic clearance. However, existing activity estimation questionnaires have not been developed for patients with chronic kidney disease (CKD) and may not be appropriate for this patient population. Our aim in this study was to develop a questionnaire specifically for patients with CKD and to determine its usefulness at predicting physical activity level.

### Methods

In the first phase, the Recent Physical Activity Questionnaire (RPAQ) was adapted, following extensive patient consultation, to capture low-level physical activity that is common in patients with CKD. The final version of the questionnaire (CKD-PAQ) was developed through 3 phases (89 patients in phase 1 and 77 patients in phase 2) with the items in the questionnaire amended at each stage to improve the capture of all levels of physical activity. The CKD-PAQ enquires about physical activity in the house, at work, and during recreation. Patients were recruited across the whole spectrum of CKD (stages 1-5, dialysis and transplant). Physical activity was also measured by a wrist-worn accelerometer (Actigraph Link 3D) which the participants were asked to wear continuously for 7 days. Each activity in CKD-PAQ was assigned a Metabolic Equivalent of Task (MET) value as per the Compendium of Physical Activities. Mean daily MET was estimated for each participant, which was then used to categorise participants into different levels of activity – sedentary, light and moderate/vigorous activity.

### Results

60 subjects were recruited for the final phase of the questionnaire development. Mean age was 58.3 years (57% males). The average daily MET from CKD-PAQ and RPAQ were 1.41 ( $\pm 0.45$ ) and 1.41 ( $\pm 0.44$ ) respectively. The mean vector magnitude (VM) count from accelerometer was 1342 ( $\pm 597$ ). Mean daily MET from CKD-PAQ and RPAQ had moderate correlation with VM –  $r = 0.344$  and  $0.341$  respectively ( $p = 0.01$  for both). There was significant agreement between CKD-PAQ derived moderate-vigorous activity and that from accelerometer ( $\kappa = 0.236$ ,  $p = 0.014$ ). In a linear regression model adjusted for age, sex and comorbidity score, CKD-PAQ derived MET was a significant predictor of measured physical activity (adjusted  $R^2 = 0.273$ ,  $p = 0.004$  for MET). The time spent in moderate-vigorous activity as measured by accelerometer correlated better with CKD-PAQ MET ( $r = 0.430$ ,  $p = 0.001$ ) compared to that from RPAQ ( $r = 0.377$ ,  $p = 0.005$ ). There was no correlation between RPAQ derived activity categories and that from the accelerometer.

### Conclusion

Activity measures estimated by CKD-PAQ correlated better with measured physical activity compared to that estimated from the standard RPAQ. CKD-PAQ also has the advantage of being shorter and easier to complete by patients. Moreover, accelerometers were developed for and calibrated in active, healthy individuals and so may not be as accurate in estimating MET levels in the sedentary CKD patient population. As such, some items in the CKD-PAQ questionnaire better reflect the overall activity of the CKD population and are better suited to the clinical application of the tool.

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