CHRONIC KIDNEY DISEASE. REHABILITATION

ENERGY EXPENDITURE AND PHYSICAL ACTIVITY IN END-STAGE RENAL DISEASE (ESRD): CROSS-SECTIONAL AND LONGITUDINAL OBSERVATIONS

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Introduction and Aims: Physical inactivity in dialysis patients is associated with increased mortality and may have a negative association with body composition (BC), muscle strength and quality of life (QOL). It is uncertain whether physical activity (PA) is affected by the start of dialysis, or an inherent characteristic of end-stage renal disease (ESRD). This study firstly aimed to compare PA and energy expenditure (EE) between healthy controls, pre-dialysis and prevalent dialysis patients, secondly to assess the effect of starting dialysis on PA and EE and thirdly, to study the association between PA, BC, muscle strength and QOL domains in ESRD patients.

Methods: This study consisted of a cross-sectional part and a longitudinal part. For the cross-sectional part 30 pre-dialysis patients (mean age; 60.5 years), 29 prevalent dialysis patients (mean age; 58.2 years) (dialysis vintage ≥1 year) and 18 healthy age matched controls (mean age; 61.4 years) were included. Participants wore a SenseWear™ pro 3 armband to measure PA parameters (total energy expenditure (TEE), activity related energy expenditure (AEE), number of steps and Metabolic Equivalent Task (MET)) for 24 hours on a non-dialysis day. BC was determined by the Body Composition Monitor (Fresenius Medical Care, Bad Homburg, Germany), handgrip strength (HGS) was determined by a hand held dynamometer, a four-meter walking test was conducted to determine walking speed. Short Form-36 (SF-36) questionnaires were filled out to measure physical component summary (PCS) scores for the physical domains of QOL. For the longitudinal part changes in PA and BC parameters, HGS, walking speed and PCS scores were measured in 30 pre-dialysis patients before the start of renal replacement therapy (RRT) (within one month before start) and five to six months after starting RRT.

Results: EE (TEE: 2182.83±398.42 vs. 2617.33±576.48, P=0.003) and PA parameters ((AEE: 203.50±264.67 vs. 739.72±366.62, P<0.001), (number of steps: 5164.33±2377.81 vs. 11.568±4619.75, P<0.001) and (MET's: 1.21±0.23 vs. 1.46±0.18, P<0.001)) were significantly lower in incident dialysis patients as compared with healthy controls, but not as compared with prevalent dialysis patients. No differences were found between HD and PD patients. Lean tissue index (LTI) (kg/m2) tended to be higher in incident patients as compared with prevalent patients (14.22±2.49 vs. 12.75±3.24 kg/m2, P=0.06), but no differences were found between incident patients and healthy controls (14.22±2.49 vs. 14.32±1.72 kg/m2). HGS did not differ between incident and prevalent patients as well as for healthy controls. No changes over time in the first six months after starting RRT were found for PA and BC parameters as well as for HGS, walking speed and PCS scores in the incident group. Also no differences were found between HD and PD. Furthermore, in the whole patient group (incident and prevalent) associations were found between PA parameters and LTI, walking speed, HGS and PCS scores.

Conclusions: EE and PA parameters are already decreased in the (late) pre-dialysis phase consistent with a sedentary lifestyle, despite the fact that LTI was not reduced as compared with healthy controls. In prevalent patients PA is reduced. PA on non-dialysis days was not significantly affected by the start of dialysis. PA was positively associated with LTI and QOL. The effects of uremia itself and/or co-morbidity may be related to a decline in PA in the earlier stages of chronic kidney disease (CKD). Therefore, future research in CKD 1-4 patients is necessary to unravel the pathways involved in changes in PA.

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