Walking, Sedentary Time and Health-Related Quality Life Among Kidney Transplant Recipients: An Exploratory Study

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ABSTRACT

Objectives. The primary objectives of this study were to: 1) establish walking and physical activity prevalence and sedentary time estimates; and 2) determine associations of health-related quality of life (HRQoL) with objectively assessed walking, self-reported physical activity, and sedentary time among kidney transplant recipients.

Methods. Using a cross-sectional design, kidney transplant recipients received a survey package containing measures of sedentary time, moderate-to-vigorous physical activity, and HRQoL, and a step pedometer.

Results. Thirty-two participants returned a completed survey, for a response rate of 82% (32 of 39 interested participants). The average steps per day were 9752 steps (SD = 3685) and 59% achieved public health guidelines of at least 150 minutes of moderate-to-vigorous physical activity per week. Total sedentary time during the week was 11.6 h/d whereas total sedentary time during the weekend was 8.9 h/d. Compared to those not achieving at least 10,000 steps/d, respondents who were achieving at least 10,000 steps/d had a significantly higher physical component score for HRQoL (M_{diff} = 7.8, P = .018). Similar patterns emerged for meeting physical activity guidelines and sedentary time.

Conclusion. For kidney transplant recipients, greater participation in walking, overall physical activity, and lower engagement in sedentary activity, was associated with better HRQoL.

ACCORDING to the World Health Organization, kidney transplantation is generally accepted as the best treatment both for quality of life and cost effectiveness, and is the most frequently conducted type of transplantation performed globally [1]. Advancements in transplantation procedures and immunosuppressive therapies have improved graft and patient survival in renal transplant recipients [2]. As a result of such considerable progress, improving health-related quality of life (HRQoL) among this population has become an important patient outcome [3,4]. Attempting to understand intervention strategies that improve HRQoL in kidney transplant recipients is necessary given the strong evidence suggesting that better HRQoL is associated with fewer debilitative physical and mental symptoms [5].

The Kidney Disease Global Outcomes guidelines recommend kidney transplant recipients should engage in 30 minutes of daily moderate-to-vigorous physical activity (MVPA) after an uncomplicated kidney transplantation [6].

For kidney transplant recipients, it has been suggested that walking is one way to achieve these guidelines [7]. To meet current MVPA guidelines, individuals are encouraged to walk a minimum of 3000 steps in 30 minutes on 5 days each week [8]. However, exercise and/or physical activity is rarely prescribed in the chronic kidney disease context [9]. Evidence suggests that physical activity behaviors are low among individuals who have received a kidney transplant

[10,11], and thus many patients remain physically inactive after successful kidney transplantation.

Reduction of sedentary behavior has also emerged as a potential target for improving health. Sedentary behaviors are activities low in energy expenditure, and have been conceptualized as sedentary or reclining and are in the energy-expenditure range of 1.0 to 1.5 metabolic equivalents [12,13]. Examples of sedentary behaviors include watching television or sedentary activity at a computer. Emerging research suggests sedentary time is associated with HRQoL. For example, among a sample of more than 3000 older adults, those who sat the most achieved the lowest scores in the physical domain and social participation facets of HRQoL [14]. Sedentary behavior may play an important role in HRQoL among kidney transplant recipients; however, no studies have evaluated this research question.

The primary objectives of this study were to: 1) establish walking and physical activity prevalence and sedentary time estimates for individuals living with a kidney transplant; and 2) determine associations of HRQoL with objectively assessed walking (ie, pedometers), physical activity, and sedentary time among kidney transplant recipients.

PATIENTS AND METHODS
Participants and Procedures

Ethical approval to conduct this cross-sectional study was granted by the Athabasca University Research Ethics Board. Adults with a kidney transplant living in Canada were recruited using advertisements placed in kidney transplantation-related media (eg, Kidney Foundation of Canada website). Inclusion/exclusion criteria included the following: participants must have received a successful kidney transplant; not be currently receiving dialysis therapy; be free from orthopedic conditions that would preclude walking; and reside in Canada. Participant recruitment commenced in November 2014 and was completed in June 2015. Because this was an exploratory study, no sample size estimates were considered.

After prescreening by the researcher to confirm eligibility criteria, a survey package containing a detailed information letter, questionnaire, a Piezo SC-StepMX step pedometer (Stepscount, Deep River, Ontario), 3-day step diary, and a self-addressed business reply envelope were sent to participants. After resetting the pedometer to zero each morning, participants were instructed to wear the pedometer over their dominant leg for 3 days [15] and record the value at the end of each day in the step diary that was provided. Participants were encouraged to wear the pedometer on at least one weekend day.

Assessment

Demographic and clinical information included sex, age, body mass index, marital status, education, annual household income, and employment status. Clinical information included kidney donor source, time since kidney transplantation, previous dialysis treatment, previous organ transplantation, comorbidities, and smoking.

Objective walking behavior was assessed using the Piezo SC-StepMX step pedometer. Step pedometers provide a practical low-tech option for objective and accurate monitoring of walking. The SC-StepMX is a valid tool for the measurement of step counts in individuals of various ages and body types [16].

Self-reported physical activity was assessed using the Godin Leisure-Time Exercise Questionnaire (GLTEQ) [17]. The GLTEQ contains three questions that assess the frequency of mild, moderate, and strenuous physical activity during free time in an average week over the past month.

Sedentary time was determined using the SIT-Q [18]. This questionnaire was developed as a comprehensive self-report measure to assess adult sedentary behavior across multiple domains (occupation, transportation, household, and leisure-time), and weekday and weekend. It is divided into six domains: sleeping/napping, meals, transportation, work/study/volunteering, family care, and light leisure/relaxing.

HRQoL was assessed using the RAND-12 [19], which measures physical (physical health composite [PHC]) and mental (mental health composite [MHC]) dimensions of HRQoL. Scores range from 0 to 100 and lower scores on the MHC and the PHC indicate greater disability (>50 = no disability; 40–50 = mild disability; 30–40 = moderate disability). A PHC score <42 suggests that perceived physical health problems are impeding life functioning, while a MHC score <38 likely indicates that an individual is experiencing psychological symptoms that might be impeding life functioning.

Statistical Analysis

Data was entered into SPSS version 21. Objectively assessed walking behavior was coded as 0 (<10,000 steps per day) or 1 (≥10,000 steps per day). We used this cut-point to maintain a balanced design given that the mean and median step counts were both >9000 steps per day. Self-reported MVPA was coded as 0 (not meeting MVPA guidelines; <150 minutes of MVPA per week) or 1 (meeting MVPA guidelines; ≥150 minutes of MPVA per week). Because there is no Canadian guideline for daily sedentary time, a median-split was used to dichotomize those into a low sedentary time group (<630 total min/d; <487.5 total min/d; both coded as 0) and a high sedentary time group (≥630 total min/d; ≥487.5 total min/d; both coded as 1) for weekday and weekend, respectively.

Multivariate analysis of covariance (MANCOVA) was used to test for differences in HRQoL (ie, PHC, MHC) between walking (steps/d), self-reported weekly MVPA minutes, and weekday and weekend sedentary time profiles. Independent variables that were associated with the dependent variables (bivariate correlation = $P < .20$) were included as covariates in the models. Linear independent pairwise comparisons were analyzed (using Bonferroni corrections) to examine the magnitude of the differences in the mean HRQoL scores.

RESULTS
Study Population

A total of 42 individuals contacted the study team to participate; of these, 39 were deemed eligible based on our inclusion criteria. Three were excluded because they had either not yet received a kidney transplant (n = 1) or did not live in Canada (n = 2). Of those entered in the study, 32 participants returned a completed survey and pedometer step assessment (response rate 32/39 = 82%). Sample demographic and clinical characteristics are located in Table 1.

Walking

Descriptive statistics for all health behavior measures (walking, MVPA, and sedentary time) are shown in Table 2. The total average steps/d was 9752 (SD = 3685). For