

Sedentary Behavior and Change in Kidney Function: The Hispanic Community Health Study/Study of Latinos (HCHS/SOL)

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Abstract

Background There is accumulating evidence linking prolonged sedentary time to adverse health outcomes. The effect of sedentary behavior on kidney function has not been evaluated in US Hispanics/Latinos, a population disproportionately affected by CKD.

Methods We evaluated the association between accelerometer-measured (1 week) sedentary time at baseline and kidney function among 7134 adults without CKD at entry in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL), who completed a baseline visit with accelerometry (2008–2011) and a follow-up visit (2014–2017). Outcomes included: (1) change in kidney function (eGFR and urine albumin-to-creatinine ratio, ACR), (2) incident low eGFR (eGFR <60 ml/min per 1.73 m² and eGFR decline ≥1 ml/min per year), and (3) incident albuminuria (ACR ≥17 mg/g in men or ≥25 mg/g in women). Linear regression using survey procedures was used to evaluate change in kidney function (eGFR and ACR), and Poisson regression with robust variance was used to evaluate incident low eGFR and albuminuria.

Results The median sedentary time was 12 hours/d. Over a median follow-up of 6.1 years, the mean relative change in eGFR was –0.50% per year, and there were 167 incident low eGFR events. On multivariable analysis, each 1 hour increase in sedentary time was associated with a longitudinal decline in eGFR (–0.06% per year, 95% CI, –0.10 to –0.02). There was a significant interaction with sex, and on stratified analyses, higher sedentary time was associated with eGFR decline in women but not men. There was no association between sedentary time and the other outcomes.

Conclusions Sedentary time was associated with a small longitudinal decline in eGFR, which could have important implications in a population that experiences a disproportionate burden of CKD but further investigation is needed.

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Introduction

Sedentary behavior, defined as waking activities performed sitting or reclining that result in little energy expenditure above the resting state, is receiving increased recognition as a potential modifiable risk factor for disease (1,2). Sedentary behavior is extremely common, with US adults being sedentary over 8 h/d (3). The US Department of Health and Human Services Physical Activity Guidelines (second edition) recommend that people decrease time spent sedentary and replace it with low-intensity physical activity or, if able, moderate-intensity

activities (4). There is accumulating evidence linking prolonged sedentary time to adverse physiologic and metabolic changes (5–9). Furthermore, prolonged sedentary time has been linked with unfavorable changes in cardiometabolic biomarkers and been associated with increased risk of type 2 diabetes mellitus, cardiovascular disease, cancer, and mortality (3,6,8–11).

The effect of sedentary behavior on kidney function has not been extensively evaluated. However, it is reasonable to hypothesize that high amounts of sedentary time may adversely affect kidney function

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because of the influence on risk factors such as BP, lipids, and glucose metabolism (7). Although several cross-sectional studies have reported a significant association between sedentary time and prevalent CKD (12,13), there have been few longitudinal studies, and we are not aware of prior studies that have evaluated the relationship between device assessed sedentary time and changes in kidney function. This is of particular relevance for US Hispanics/Latinos, a large, growing minority population that is projected to be 20%–30% of the US population by 2050, which has a high burden of CKD and a high prevalence of sedentary behavior, with US Hispanics/Latinos being noted to spend over 11 h/d being sedentary (6,14–18). The Hispanic Community Health Study/Study of Latinos (HCHS/SOL) provides a unique opportunity to study the association between sedentary time and kidney function among diverse Hispanics/Latinos in the United States. The primary purpose of this study is to evaluate the effect of sedentary behavior on kidney function in US Hispanics/Latinos to explore whether sedentary behavior is a modifiable risk factor for the development of kidney disease in a population that experiences a disproportionate amount of CKD. We hypothesized that higher sedentary time at baseline would be associated with a decline in kidney function over time.

Materials and Methods

Study Population and Sampling Design

HCHS/SOL is a population-based cohort of 16,415 Hispanics/Latinos aged 18–74 years from randomly selected households in four US field centers (Chicago, IL; Miami, FL; Bronx, NY; San Diego, CA). Individuals underwent a baseline examination (2008–2011), yearly telephone follow-up assessments, and a singular follow-up clinic visit (2014–2017). Participants self-reported their background as Cuban, Dominican, Mexican, Puerto Rican, Central American, South American, or other/mixed. The sample design and cohort selection have been previously described (19). A stratified multistage area probability sampling method was utilized at each field center. Sampling weights were generated reflective of the probability of selection at each stage.

From the 16,415 at baseline, 2451 had CKD (defined as eGFR <60 ml/min per 1.73 m² or urine albumin-to-creatinine ratio [ACR] ≥17 mg/g men or ≥25 mg/g women) at baseline. From the 13,964, 9922 came to visit 2. Of those, we excluded 1996 due to incomplete accelerometry data at baseline and 762 due to missing kidney function measures at the follow-up visit. Of the 7164 meeting inclusion criteria, 30 participants were excluded due to missing covariates (educational attainment, *n*=5; nativity, *n*=1; smoking status, *n*=11; systolic BP, *n*=2; C-reactive protein [CRP], *n*=2; and body mass index [BMI], *n*=9). The final analysis sample size is 7134 (Figure 1). Those who did not meet inclusion had similar demographic characteristics (54% female, age 39.9 years, eGFR 106.2 ml/min per 1.73 m², and sedentary time/d 12 hours) as those in the analytic sample. Sampling weights were adjusted for visit 2 nonresponse, and these were further adjusted to account for accelerometer missing data using inverse probability weights (20).

The study was approved by the Institutional Review Boards of all participating institutions, where all participants gave written consent and in adherence to the Declaration of Helsinki.

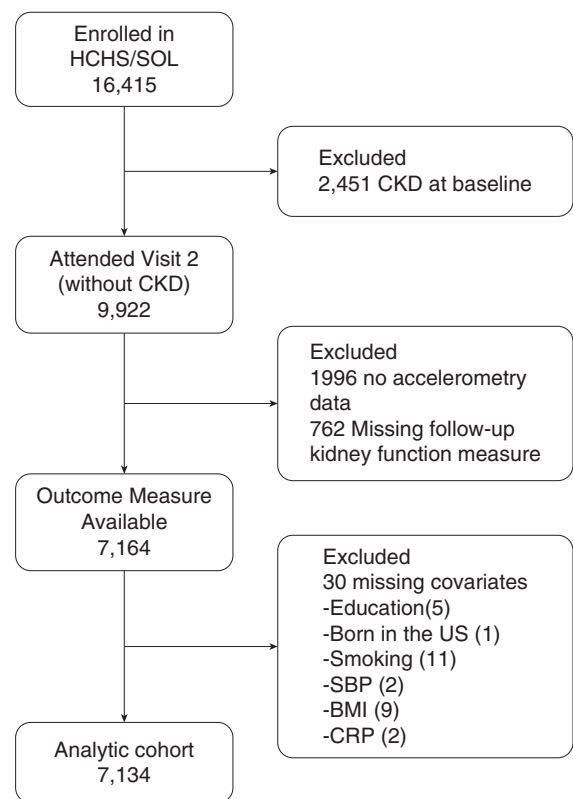


Figure 1. | Analytic cohort flowchart. HCHS/SOL, Hispanic Community Health Study/Study of Latinos; CKD, chronic kidney disease; SBP, systolic blood pressure; BMI, body mass index; CRP, C-reactive protein.

Exposure

As described previously in work by HCHS/SOL, participants were instructed to wear the Actical version B-1 (model 198–0200–03; Respironics Co. Inc., Bend, OR) accelerometer on the hip for 1 week with removal for sleeping, showering, and swimming (6,15,21). The Actical was programmed to collect data in 1 minute epochs (22,23). The Actical is a reliable measure of physical activity, and count cutpoints have been previously established to evaluate sedentary time (24–26). Adherence to the Actical was defined as having a minimum of 3 days of at least 10 h/d of data (20). Nonwear was defined using Choi’s algorithm as at least 90 minutes of continuous zero counts, but with allowance for short intervals with nonzero counts (27). Sedentary time was defined as the cut point of 0–100 counts/min (26). Time spent sedentary was calculated by summing the minutes in each day and averaging across adherent days. Sedentary time was evaluated as both a continuous variable and as quartiles. Additionally, due to the strong correlation between sedentary time and wear time and the large variability of wear time, sedentary time was standardized to 16 hours of wear time per day (6).

Outcomes

Primary outcomes included: (1) annualized percent change in eGFR and (2) annualized change in ACR. Secondary outcomes included: (1) incident low eGFR (eGFR

<60 ml/min per 1.73 m² and a decline in eGFR \geq 1 ml/min per year), and (2) incident albuminuria (ACR \geq 17 mg/g men or \geq 25 mg/g women). eGFR was calculated using the CKD Epidemiology Collaboration creatinine-cystatin C equation (28). Creatinine was measured in serum and urine on a Roche Modular P Chemistry Analyzer with a creatinase enzymatic method (Roche Diagnostics, Indianapolis, IN 46250). Serum creatinine measurements were isotope dilution mass spectrometry traceable. Urine albumin was measured with an immunoturbidometric method on the ProSpec nephelometric analyzer (Dade Behring GMBH; Marburg, Germany D-35041). Serum Cystatin C was measured with a turbidimetric method on the Roche Modular P Chemistry Analyzer (Gentian AS, Moss, Norway).

Covariates

The baseline clinical examination included questionnaires, clinical measurements, venous blood sampling, and urine specimen collection (29). Participants were administered questionnaires to obtain information on age, sex, Hispanic/Latino background, education, income, language preference, place of birth, and smoking. Participants brought in all medications to determine medication usage and completed a health history questionnaire. Three separate seated BP readings were obtained after a 5 minute rest using an automatic sphygmomanometer (OMRON HEM-907 XL), and BP was defined as the average of three measurements. BMI was calculated averaging two body weight and two height measures. Hypertension was defined as systolic BP \geq 140 mm Hg, or diastolic BP \geq 90 mm Hg, or the use of antihypertensive medication. Diabetes mellitus was defined as fasting plasma glucose of \geq 126 mg/dl, 2-hour postload glucose levels of \geq 200 mg/dl, HbA1c level of \geq 6.5%, or the use of antidiabetic medication. CRP was measured on a Roche Modular P Chemistry Analyzer (Roche Diagnostics Corporation) with an immunoturbidimetric method.

Statistical Analyses

Descriptive statistics for demographic and clinical characteristics at baseline were summarized, and reported means and frequencies were weighted to adjust for sampling probability and nonresponse. Continuous and categorical variables were compared using ANOVA or chi-squared tests, respectively. Survey-specific procedures were conducted to evaluate the associations with each outcome. Point estimates and 95% confidence intervals (95% CI) were computed using linear regression for continuous outcomes (change in eGFR and ACR) and Poisson regression with robust variance for discrete outcomes (incident low eGFR and albuminuria). Percent annual change in eGFR was calculated as the difference between baseline and follow-up eGFR divided by the number of years elapsed between the two visits (range 3.4–9.5 years) as an offset. Change in ACR was calculated in the same manner. On the basis of prior literature, we adjusted for potential confounders ascertained at baseline including clinical center, Hispanic/Latino background, age, sex, education, language preference, born in United States, diabetes, cardiovascular disease, systolic BP, BMI, smoking, angiotensin converting enzyme inhibitor/angiotensin receptor blocker, CRP, and baseline

albuminuria and eGFR (6,13,15,30). We explored effect modification by age, sex, and diabetes status at baseline by separately testing interaction terms for sedentary time and each of these variables in the final regression model. Additionally, as an exploratory analysis, we adjusted for time spent in moderate-to-vigorous physical activity (MVPA, defined as \geq 1535 counts/min) in a separate model due to controversy surrounding the rationale of adjusting for MVPA in studies of sedentary behavior (31). All hypothesis tests were two sided with a significance level of 0.05, and interaction testing with a significance level of 0.1. Assumptions of all models and tests were checked. All analyses were performed using SAS 9.3 software (SAS Institute, Cary, NC) and R version 3.6.

Results

Baseline Demographic and Clinical Characteristics

Overall, at baseline, the mean age was 39.6 years old and 52% of participants were female (Table 1). The median sedentary time per day was 12 (1–16) hours. The mean eGFR was 109.0 ml/min per 1.73 m² and median ACR was 6 mg/g. Compared with those in the lowest quartile of sedentary time, those in the highest quartile were older and had lower MVPA, higher BMI, lower eGFR, and higher ACR. Women were more likely to be in the highest quartile of sedentary time.

Outcomes

Change in Kidney Function

Over a median follow-up time of 6.1 years, the mean change in eGFR was -0.50% per year (95% CI, -0.57% to -0.43%), and the mean change in ACR was 0.3 mg/g per year. In multivariable adjusted analysis, each 1 hour increase in sedentary time was associated with a more rapid decline in eGFR (-0.06% per year; 95% CI, -0.10 to -0.02) (Table 2). Those with the highest sedentary time had a more rapid decline in eGFR compared with those with the lowest sedentary time (-0.28% per year; 95% CI, -0.48 to -0.08).

There was significant effect modification by sex ($P=0.06$). In stratified analyses, each 1 hour increase in sedentary time was associated with a significant eGFR decline in women but not in men (-0.09% per year; 95% CI, -0.15 to -0.04 versus -0.04% per year; 95% CI, -0.09 to 0.00). There was no significant effect modification by age or diabetes status. In an exploratory analysis, the relationship between sedentary time and change in eGFR remained significant after adjusting for time spent in MVPA (-0.06% per hour increase sedentary time per year; 95% CI, -0.10 to -0.02). On multivariable analysis, there was no association between sedentary time and change in ACR (Table 2).

Incident Low eGFR and Albuminuria

During follow-up, 167 (2.3%) participants developed incident low eGFR, 470 (7%) developed incident albuminuria, and 33 (0.05%) developed both incident low eGFR and incident albuminuria. Crude rates of incident low eGFR were progressively higher across increasing quartiles of sedentary time, but this pattern was not seen for rates of incident albuminuria (Figure 2). On multivariable analyses, sedentary time was not associated with incident low eGFR

Table 1. Baseline (2008–2011) characteristics of sample from the Hispanic Community Health Study/Study of Latinos by quartile of sedentary time

Variable	Total Sample (n= 7134)	Quartiles of Sedentary Time			
		1 (n= 1780)	2 (n= 1782)	3 (n=1782)	4 (n= 1790)
Sedentary time, h/d, median (range)	12.0 (1.0–16.0)	9.9 (1.0–10.8)	11.5 (10.8–12.0)	12.4 (12.0–13.0)	13.6 (13.0–16.0)
MVPA, min/d, median (range)	106.2 (0.0–5017.3)	205.3 (0.0–5017.3)	121.0 (0.0–1324.2)	89.8 (0.0–1603.0)	47.6 (0.0–1549.3)
Age, yr, mean (SEM)	39.6 (0.33)	38.0 (0.50)	38.6 (0.58)	40.3 (0.58)	41.4 (0.74)
Women, % (SE)	51.7 (0.95)	41.7 (1.85)	54.0 (2.15)	57.1 (2.14)	54.1 (1.94)
Hispanic/Latino background, mean (SEM)					
Mexican	37.2 (1.71)	48.7 (2.73)	41.7 (2.23)	34.0 (2.20)	24.3 (2.01)
Cuban	20.8 (1.72)	17.6 (2.08)	21.6 (2.25)	24.0 (2.52)	20.2 (2.12)
Puerto Rican	15.7 (0.95)	12.0 (1.42)	14.2 (1.49)	15.2 (1.39)	21.4 (1.65)
Dominican	9.7 (0.79)	5.6 (1.07)	6.3 (0.89)	9.9 (1.34)	16.8 (1.47)
Central American	7.6 (0.77)	7.5 (1.15)	7.3 (1.14)	7.7 (0.91)	7.8 (0.98)
South American	4.9 (0.39)	4.2 (0.58)	4.6 (0.74)	5.9 (0.78)	4.7 (0.71)
Other	4.2 (0.53)	4.5 (1.11)	4.2 (1.36)	3.2 (0.77)	4.8 (0.88)
< High school, % (SE)	31.1 (1.00)	33.5 (1.95)	29.9 (1.69)	28.0 (1.68)	32.8 (1.83)
Annual income, ≤\$20,000, mean (SEM)	47.1 (1.24)	44.1 (2.18)	45.3 (2.25)	47.0 (2.20)	52.3 (2.07)
Health insurance, % (SE)	50.0 (1.22)	40.5 (2.06)	46.0 (2.05)	53.3 (2.18)	60.1 (2.07)
Spanish language preference, % (SE)	74.7 (1.16)	79.6 (2.09)	74.1 (2.00)	74.0 (1.83)	71.0 (2.08)
US born, % (SE)	23.1 (1.08)	19.3 (1.80)	23.3 (1.98)	23.7 (1.84)	26.2 (1.94)
≥10 yr in the United States, % (SE)	70.3 (1.29)	68.4 (2.00)	69.2 (2.04)	70.4 (2.03)	73.3 (1.83)
Diabetes, % (SE)	11.0 (0.50)	6.9 (0.72)	8.3 (0.74)	11.2 (1.06)	17.4 (1.29)
Hypertension, % (SE)	17.2 (0.69)	12.9 (1.07)	15.3 (1.17)	16.5 (1.33)	24.0 (1.37)
Current smoker, % (SE)	19.8 (0.89)	22.4 (1.72)	19.4 (1.61)	19.7 (1.81)	17.6 (1.60)
Current alcohol use, % (SE)	0.9 (0.14)	0.7 (0.35)	0.6 (0.19)	1.0 (0.29)	1.2 (0.29)
Systolic BP, mm Hg, mean (SEM)	118.1 (0.28)	117.4 (0.53)	117.2 (0.54)	117.4 (0.56)	120.2 (0.59)
Diastolic BP, mm Hg, mean (SEM)	71.3 (0.21)	70.7 (0.42)	71.2 (0.41)	70.9 (0.43)	72.5 (0.37)
Body mass index, kg/m ² , mean (SEM)	29.3 (0.13)	28.9 (0.22)	29.2 (0.23)	29.2 (0.29)	29.7 (0.25)
Total cholesterol, mg/dl, mean (SEM)	192.6 (0.85)	192.0 (1.48)	191.8 (1.56)	193.5 (1.90)	193.1 (1.47)
LDL cholesterol, mg/dl, mean (SEM)	119.4 (0.73)	119.6 (1.32)	119.0 (1.32)	119.7 (1.58)	119.3 (1.24)
HDL cholesterol, mg/dl, mean (SEM)	48.3 (0.27)	48.0 (0.51)	48.5 (0.58)	48.9 (0.47)	47.7 (0.50)
Triglycerides, mg/dl, mean (SEM)	126.8 (1.73)	122.9 (3.09)	123.3 (3.19)	126.4 (3.49)	134.4 (3.87)
Glycosylated hemoglobin, % (SE)	5.6 (0.02)	5.6 (0.03)	5.6 (0.03)	5.6 (0.03)	5.7 (0.04)
CRP, mg/L, mean (SEM)	3.5 (0.09)	3.1 (0.16)	3.3 (0.19)	3.5 (0.17)	4.0 (0.19)
eGFR (ml/min per 1.73 m ²), mean (SEM)	109.0 (0.40)	111.8 (0.63)	110.5 (0.63)	108.3 (0.68)	105.5 (0.75)
ACR (mg/g) (median, range)	6.0 (4.4–8.9)	5.8 (4.2–8.3)	6.1 (4.4–8.9)	5.9 (4.4–9.1)	6.3 (4.5–9.7)
ACE inhibitor or ARB, % (SE)	9.3 (0.47)	6.1 (0.66)	7.8 (0.81)	9.4 (1.02)	13.9 (1.10)

MVPA, moderate-to-vigorous physical activity; CRP, C-reactive protein; ACR, urine albumin-to-creatinine ratio; ACE, angiotensin converting enzyme; ARB, angiotensin receptor blocker.

Table 2. Association of sedentary time with change in eGFR and urine albumin-to-creatinine ratio

Sedentary Time		Percent Change in eGFR Per Yr, (95% Confidence Interval)	Change in ACR Per Yr β (95% Confidence Interval)
Continuous Quartiles	Per 1-h increase	−0.06% ^a (−0.10 to −0.02)	0.08 (−0.15 to 0.31)
	Quartile 1	Referent	Referent
	Quartile 2	−0.14% (−0.30 to 0.02)	−0.05 (−0.42 to 0.33)
	Quartile 3	−0.19% ^a (−0.36 to −0.02)	−0.18 (−0.59 to 0.24)
	Quartile 4	−0.28% ^a (−0.48 to −0.08)	0.65 (−0.73 to 2.03)

Adjusted for clinical center, Hispanic background group, age, sex, education, language preference, US born, diabetes, cardiovascular disease, systolic BP, body mass index, smoking, angiotensin converting enzyme, angiotensin receptor blocker, C-reactive protein, and baseline albuminuria and eGFR, and used time between visits as an offset.

^a $P < 0.05$.

or albuminuria (Table 3). On sensitivity analysis, sedentary time was not associated with incident $>30\%$ decline in eGFR from baseline. Additionally, there was no evidence of effect modification by age, sex, or diabetes status.

Discussion

To the best of our knowledge, this represents the first study to evaluate the association between device assessed sedentary time and kidney outcomes among US Hispanics/Latinos. In this large, community-based cohort of US Hispanics/Latinos, higher sedentary time was associated with a small relative percent decline in eGFR but not increased albuminuria or the secondary outcomes. Although the magnitude of the decline was small, our findings could have significant public health implications across the lifespan of US Hispanics/Latinos. There is a paucity of information regarding the influence of sedentary behavior on kidney outcomes in US Hispanics/Latinos, a population that experiences high rates of incident CKD, with 31% higher incidence of kidney failure in Hispanics as compared with non-Hispanics in 2016 (17,32,33). Furthermore, a recent publication from HCHS/SOL reported that US Hispanics/Latinos spent 74% of their monitored time in sedentary behaviors (16).

Although the magnitude of the eGFR decline found in our study was small, the population studied was relatively young and continued loss of kidney function over the lifespan could potentially have serious consequences. Furthermore, interventions to decrease sedentary time have been successful at improving cardiometabolic biomarkers in the general population (34,35). Our findings support the need to investigate culturally tailored interventions directed at reducing sedentary time for the primary prevention of kidney disease in US Hispanics/Latinos.

The mechanisms linking sedentary behavior to a decline in eGFR are not clear. However, evidence suggests sedentary behavior adversely affects health through several pathways (5,36,37). There is growing evidence demonstrating

that sedentary behavior has adverse effects on BP, vascular function, glucose regulation, and inflammation, which is relevant because these factors have also been associated with declines in kidney function (36,38–45). In contrast to our findings with eGFR, we did not see an association between sedentary time and albuminuria. Reasons for this are not fully clear. It is possible that sedentary behavior may have a larger effect on hemodynamic factors that influence GFR than on factors influencing albuminuria.

There have been very few studies that have evaluated the association between sedentary behavior and kidney outcomes. The studies that have been done have primarily focused on self-reported television viewing time, and the findings from these studies have been heterogeneous. Similar to our findings, Lynch *et al.* (13) did not find in their sample, of which 56% watched <2 hours of television per day, an association between television viewing time and incident CKD in an Australian cohort of 6293 middle-aged adults. In contrast, using data on 3075 participants from the Health, Aging, and Body Composition (Health ABC) Study, Hawkins *et al.* (46) reported that self-reported television viewing of >3 hours per day, which was reported in 36% of their population, was associated with a higher risk for incident CKD. However, the mean age in this sample was over 70 years, and this may explain the difference in their findings. Longer follow-up time may be needed to determine if sedentary behavior is associated with incident CKD in the HCHS/SOL cohort.

We observed differences between men and women. At study entry, there was a higher percentage of women in the highest quartile of sedentary time as compared with the lowest quartile (54.1% versus 41.7%). In addition, we found a significant association between sedentary time and percent change in eGFR for women but not men. Although the differences were statistically significant, the change in eGFR was modest and may not be clinically relevant. Reasons for these sex-related differences are not clear. However, women have been found to behave metabolically differently from

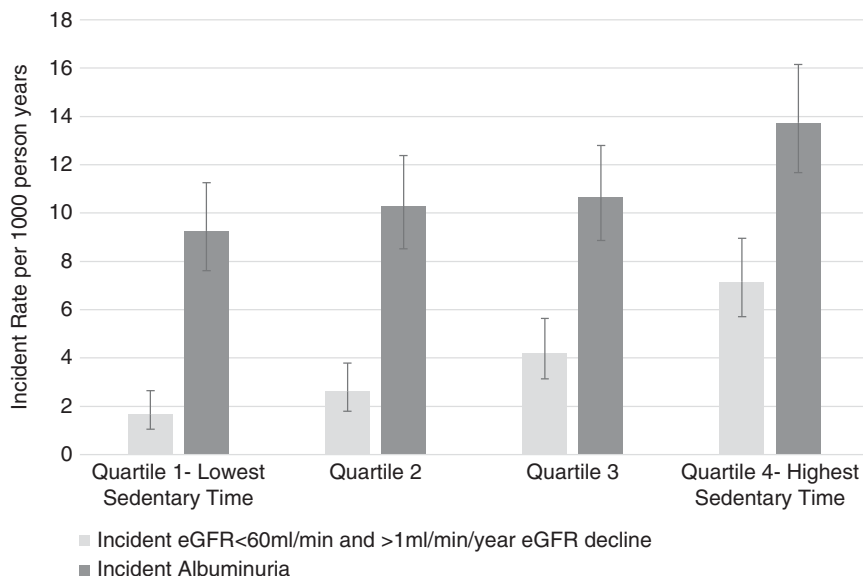


Figure 2. | Incident CKD rate per 1000 person years Hispanic Community Health Study/Study of Latinos (HCHS/SOL) (2008–2017).

Table 3. Association of sedentary time with incident low eGFR and albuminuria, incident density ratio (95% confidence interval)

Sedentary Time		Incident Low eGFR	Incident Albuminuria
Continuous	Per 1-h increase	0.89 (0.78 to 1.02)	1.06 (0.96 to 1.17)
Quartiles	Quartile 1	Referent	Referent
	Quartile 2	0.77 (0.31 to 1.93)	0.86 (0.58 to 1.29)
	Quartile 3	1.06 (0.48 to 2.35)	0.78 (0.48 to 1.26)
	Quartile 4	0.61 (0.27 to 1.39)	1.38 (0.91 to 2.1)

Adjusted for clinical center, Hispanic background group, age, sex, education, language preference, U.S. born, diabetes, cardiovascular disease, systolic BP, body mass index, smoking, angiotensin converting enzyme, angiotensin receptor blocker, C-reactive protein, and baseline albuminuria and eGFR, and used time between visits as an offset in Poisson regression.

men in experimental studies of forced bedrest, with women experiencing more lipogenesis and insulin resistance than men (47). Additionally, sedentary activities have been found to be associated with greater risk of metabolic syndrome in women than men (48). Our findings suggest that US Hispanic/Latino women may be more vulnerable to the adverse effects of sedentary time on kidney function and may be an ideal population to target for an intervention but further investigation is needed.

The influence of sedentary time on eGFR remained significant after adjusting for MVPA in our exploratory analysis. Our findings are consistent with other investigations that have similarly found that sedentary time is associated with adverse health outcomes independent of time spent in MVPA (10,30). Further investigation is needed to determine the influence of decreasing sedentary time on eGFR and whether MVPA has a role in this relationship, which would have important implications for preventive strategies in this population.

This study has several strengths. It represents one of the first studies to evaluate the relationship between objectively measured sedentary time and changes in kidney function in a diverse cohort of US Hispanics/Latinos. However, this study is not without limitations. Although the Actical has strength as an omnidirectional accelerometer, it does not contain an inclinometer or posture monitor, which may be more sensitive measures of sedentary behavior (49), and this could have led to incomplete measurement of sedentary time. Although participants were instructed to wear the accelerometer only when awake, we cannot be certain the accelerometer was worn for all waking hours. A single follow-up measurement of eGFR and urine ACR were utilized, which may not have captured steady-state kidney function. Although HCHS/SOL is strong in its diversity, our findings are not generalizable to all US Hispanic/Latino populations, given the recruitment centers were in four metropolitan areas.

In conclusion, we found an association between device-assessed sedentary time and relative change in eGFR over time in US Hispanics/Latinos. Although the changes in eGFR were small, our findings may have important implications at the population level for primary prevention of kidney disease over the lifetime in US Hispanics/Latinos, a population that experiences a disproportionate burden of CKD. More investigation is needed to expand and confirm our findings, given the modest changes in eGFR noted in this relatively young and healthy sample. Further investigation is also needed into the effect of culturally tailored interventions to decrease sedentary time on kidney outcomes in this at-risk population.

Disclosures

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Author Contributions

A.C. Ricardo was responsible for the conceptualization, supervision, validation, and writing the original draft. D. Sotres-Alvarez was responsible for the conceptualization. J. Cai was responsible for the methodology and supervision. J.P. Lash was responsible for the conceptualization, methodology, supervision, validation, and writing the original draft. M. Hannan was responsible for the conceptualization, validation, and writing the original draft. M.L. Daviglus was responsible for the conceptualization, project administration, and supervision. N. Franceschini was responsible for the supervision. All authors were responsible for the writing review and editing.

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