

Daily Sitting Time and Its Interplay With Physical Activity In Association With All-Cause Mortality Among U.S. Adults With Diabetes

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BACKGROUND

- Diabetes poses a significant health and economic burden in the United States.
- The U.S. federal government and the World Health Organization congruently recommended individuals with diabetes limit their time spent being sedentary and engage in at least 150 minutes of moderate-to-vigorous physical activity per week.
- Unlike the well-acknowledged role of physical activity in diabetes management, the health consequences of prolonged sedentary time in adults with diabetes remain unclear.

STUDY AIMS AND HYPOTHESES

- First, we aimed to investigate if there is an association of daily sitting time with mortality among U.S. adults with diabetes.
- Second, we aimed to investigate if the association varies by different physical activity levels.
- We hypothesized that there is a positive association between daily sitting time and mortality among U.S. adults with diabetes, particularly among those who were physically inactive. For those having at least 150 minutes of moderate-to-vigorous physical activity per week, there is no association between daily sitting time and mortality.

METHODS

- **Study population:** The National Health and Nutrition Examination Survey (NHANES) is a series of ongoing, cross-sectional, nationally representative surveys designed to monitor the health and nutritional status of the U.S. civilian, non-institutionalized, resident population. This study included participants aged ≥ 20 years with diagnosed diabetes from the NHANES 2007 to 2018. Exclusions were made for participants with active pregnancies, incomplete data on daily sitting time or physical activity, or those lacking mortality data linkage. A total of 4,556 participants were retained as the study population.
- **Exposure:** The Global Physical Activity Questionnaire was administered. NHANES participants were asked how many minutes they spent sitting or reclining on a typical day, excluding sleeping time. We converted responses into hours per day and referred to it as the daily sitting time.
- **Covariates:** Information on age, sex, race/ethnicity, family income to poverty ratio, education level, health insurance, cigarette smoking, alcohol intake, moderate-to-vigorous physical activity, diabetes duration, hyperglycemic medication use, and chronic health conditions was collected at enrollment. Body mass index was calculated by dividing the measured weight in kilograms by the measured height in meters squared.
- **Outcome:** All-cause mortality was ascertained by the linkage of the NHANES participants to the National Death Index from enrollment through the end of 2019.

METHODS (CONT.)

- **Statistical analysis:** We followed the NHANES guidelines to account for its complex survey design, including sampling weights, clustering, and stratification in all analyses. We presented participant characteristics at baseline using weighted means (standard errors) for continuous variables, and weighted percentages (unweighted frequencies) for categorical variables.

STUDENT CONTRIBUTION

- First, I conducted the literature review to identify the research gap and generate the research idea.
- Second, I carefully went through the NHANES tutorials and downloaded the NHANES data.
- Third, I conducted the data cleaning and exploration, including examining the variable distribution and potential outliers (participants with extreme values and high sampling weights).
- Fourth, I presented the participant characteristics at enrollment using the survey procedures in SAS software, version 9.4 (SAS Institute Inc., Cary, NC, USA)

NEXT STEPS

- To analyze the time-to-event data, I will perform the Cox proportional hazards model to examine the association of daily sitting time (both treated as a continuous variable and a categorical variable [< 4 h/d, 4 – < 6 h/d, 6 – < 8 h/d, or ≥ 8 h/d]) with all-cause mortality, stratified by levels of moderate-to-vigorous physical activity (0 mins/week, 0 – < 150 mins/week, and ≥ 150 mins/week).

LESSONS LEARNED

- Given that we aimed to investigate if the association of daily sitting time and mortality among U.S. adults with diabetes is modified by physical activity levels, we should ensure that in each combined category of physical activity (0 mins/week, 0 – < 150 mins/week, and ≥ 150 mins/week) and daily sitting time (< 4 h/d, 4 – < 6 h/d, 6 – < 8 h/d, or ≥ 8 h/d), the number of participants and deaths should be appropriate for data analysis. Otherwise, we need to combine certain categories to mitigate sparse data problems.

REFERENCES

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