

# Associations between polysomnography and actigraphy-based sleep indices and glycemic control among those with and without type 2 diabetes: the Multi-Ethnic Study of Atherosclerosis

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## Abstract

### Study Objectives

To examine the associations of sleep measures with hemoglobin A1c (HbA1c) among individuals with and without type 2 diabetes.

### Methods

Data were from 2049 Multi-Ethnic Study of Atherosclerosis participants taking part in a sleep ancillary study. Cross-sectional linear regression models examined associations of actigraphy estimates of sleep (sleep duration, variability, and maintenance efficiency) and polysomnography measures (obstructive sleep apnea [OSA] and hypoxemia) with HbA1c, stratified by diabetes status. Primary models were adjusted for demographics, lifestyle behaviors, and obesity.

### Results

Among individuals with diabetes (20 per cent population), those who slept <5 hr/night had greater HbA1c than those who slept 7–8 hr/night (7.44 vs. 6.98 per cent,  $p_{\text{trend}} = 0.04$ ), with no attenuation of associations after adjusting for OSA/hypoxemia. In women with diabetes, but not men, those in the lowest quartile of sleep maintenance efficiency had greater HbA1c than those in the highest quartile of sleep maintenance efficiency (7.60 vs. 6.97 per cent,  $p_{\text{trend}} < 0.01$ ). Among those without diabetes, individuals with severe OSA or in the highest quartile of hypoxemia had significantly greater HbA1c than those without OSA or who were in the lowest quartile of hypoxemia (5.76 vs. 5.66 per cent,  $p_{\text{trend}} = 0.01$ ; 5.75 vs. 5.66 per cent,  $p_{\text{trend}} < 0.01$ , respectively). Associations did not meaningfully differ by race/ethnicity.

### Conclusions

Among individuals with diabetes, HbA1c was significantly higher in men and women with short sleep duration and in women with poor sleep maintenance efficiency, suggesting a role for behavioral sleep interventions in the management of diabetes. Among individuals without diabetes, untreated severe OSA/hypoxemia may adversely influence HbA1c.

[sleep duration](#), [sleep duration variability](#), [sleep maintenance efficiency](#), [sleep-disordered breathing](#), [diabetes](#), [hemoglobin A1c](#), [actigraphy](#), [polysomnography](#)

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