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Sleep efficiency partially explains morning vascular endothelial function in healthy adults

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Keywords

Adult, Humans, Cardiovascular Diseases, Nitric Oxide, Biological Availability, Risk Factors, Hypertension, Biomarkers, Chronic Disease

Abstract

Background:

Poor sleep efficiency is associated with higher cardiovascular risk. Vascular endothelial function (VEF) is a non-invasive, nitric-oxide-mediated biomarker of cardiovascular disease assessed in the brachial artery by flow-mediated dilation (FMD). Prior work found an association between sleep efficiency and FMD in people with hypertension. The relationship between sleep efficiency and FMD in people without chronic diseases is unclear.

Methods:

Eleven healthy adults (Mean age: 32 years, Range: 25-50 years, 8 females and 3 males) completed 7 days of at-home measurements of their physical activity levels and sleep parameters by wearing an accelerometer (ActiGraph, LLC) on their non-dominant wrist and a sleep diary, before visiting the laboratory for vascular measurements. Upon arrival to the laboratory in the morning, in a fasted state, we measured brachial artery FMD. In preparation for a stepwise analysis, simple unadjusted correlations were first calculated between FMD and anthropometric and demographic factors, physical activity, sleep, hemodynamic, and vascular parameters. Factors were then included in the linear multivariate analysis using the stepwise model if they presented a P value <0.10 with FMD and a correlation coefficient <0.6 between them to avoid collinearity. The variance in FMD was explained by adjusted R^2 and beta coefficients with 95% confidence intervals. Significance was set as $p<0.05$.

Results:

Individually, sleep efficiency (r=+0.69, p=0.02) and wake after sleep onset (WASO) (r=+0.68, p=0.02), but not sleep latency (r=-0.47, p=0.18) were associated with FMD. After inclusion in a stepwise analysis, Sleep efficiency accounted for 41% of the variance in FMD% (p=0.04, unstandardized beta = 0.58).

Conclusion:

Preliminary data indicate that in healthy adults without chronic cardiometabolic or sleep disorders, sleep efficiency is significantly associated with morning FMD. In particular, not sleep latency, but WASO drove this relationship. Impairment in nitric-oxide-bioavailability may be a mechanism by which poor sleep increases cardiovascular risk.