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ORIGINAL ARTICLES

Do Differences in Sleep Architecture Exist between Persons with Type 2 Diabetes and Nondiabetic Controls?

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Abstract

Background:

It has been shown previously that the suppression of slow-wave sleep (SWS) markedly reduced insulin sensitivity and led to an impairment of glucose tolerance. We hypothesized that a decreased amount of SWS is a feature peculiar to subjects with type 2 diabetes.

Method:

A retrospective case-control study analyzed polysomnographic recordings and covariate data of 22 type 2 diabetic and 22 nondiabetic subjects [n = 44; 8 women, 36 men, aged 57.5 ± 5.5 years, body mass index (BMI) 33.8 ± 5.9 kg/m^2, apnea–hypopnea index (AHI) 29.6 ± 22.2 episodes/hr] matched individually for sex, race, age, BMI, and severity of sleep-related breathing disorders (SRBD). We assessed differences in sleep architecture between the study group and the control group. Primary end points included the percentage of total sleep time spent in each sleep stage.

Results:

Despite similar age and severity of SRBD, subjects with type 2 diabetes demonstrated a significantly decreased amount of SWS (3.9 ± 5.95% vs 8.4 ± 4.57%; p = 0.012), increased percentage time in rapid eye movement sleep (24.1 ± 12.14% vs 13.8 ± 6.96%; p = 0.005), and higher arousal index (44.3 ± 19.53/hr vs 35.7 ± 12.67/hr; p = 0.037) compared to nondiabetic controls. After adjustment for sex, BMI, AHI, and smoking, age and presence of type 2 diabetes were independent predictors of the decreased SWS percentage (p = 0.001). Variables in this model accounted for 34% of the variance in the SWS percentage in our cohort.

Conclusions:

Results demonstrated distinct differences in sleep architecture in our cohort with decreased amounts of SWS in type 2 diabetes. These findings suggest that polysomnographic recognition of altered sleep architecture may be partially implicated in the early detection of persons with type 2 diabetes.

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Abbreviations: (AASM) American Academy of Sleep Medicine, (AHI) apnea–hypopnea index, (ArI) total arousal index, (BMI) body mass index, (EEG) electroencephalogram, (ESS) Epworth Sleepiness Scale, (NREM) nonrapid eye movement, (ODI) oxygen desaturation index, (PSG) polysomnography, (REM) rapid eye movement, (SRBD) sleep-related breathing disorders, (SWS) slow-wave sleep

Keywords: polysomnography, sleep architecture, sleep-related breathing disorders, slow-wave sleep, type 2 diabetes

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