**Sleep Duration as a Risk Factor for Diabetes Incidence in a Large US Sample**

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**Study Objectives:** To explore the relationship between sleep duration and diabetes incidence over an 8- to 10-year follow-up period in data from the First National Health and Nutrition Examination Survey (NHANES I). We hypothesized that prolonged short sleep duration is associated with diabetes and that obesity and hypertension act as partial mediators of this relationship. The increased load on the pancreas from insulin resistance induced by chronically short sleep durations can, over time, compromise β-cell function and lead to type 2 diabetes. No plausible mechanism has been identified by which long sleep duration could lead to diabetes.

**Design:** Multivariate longitudinal analyses of the NHANES I using logistic regression models.

**Setting:** Probability sample (n = 8992) of the noninstitutionalized population of the United States between 1982 and 1992.

**Participants:** Subjects between the ages of 32 and 86 years.

**Measurements and Results:** Between 1982 and 1992, 4.8% of the sample (n = 430) were determined by physician diagnosis, hospital record, or cause of death to be incident cases of diabetes. Subjects with sleep durations of 5 or fewer hours (odds ratio = 1.47, 95% confidence interval 1.03-2.09) and subjects with sleep durations of 9 or more hours (odds ratio = 1.52, 95% confidence interval 1.06-2.18) were significantly more likely to have incident diabetes over the follow-up period after controlling for covariates.

**Conclusions:** Short sleep duration could be a significant risk factor for diabetes. The association between long sleep duration and diabetes incidence is more likely to be due to some unmeasured confounder such as poor sleep quality.

**Keywords:** Sleep, diabetes, insulin resistance, obesity

**Citation:** Gangwisch JE; Heymsfield SB; Boden-Albala B; Buijs RM; Kreier F; Pickering TG; Rundle AG; Zammit GK; Malaspina D. Sleep duration as a risk factor for diabetes incidence in a large US sample. SLEEP 2007;30(12):1667-1673.

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**Catathrenia: Parasomnia or Uncommon Feature of Sleep Disordered Breathing?**

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**Objective:** We report a series of seven consecutive cases of catathrenia (sleep related groaning) that differ from limited previous reports in the literature with regard to sleep stage and response to treatment.

**Background:** Catathrenia was recently defined as a parasomnia in the International Classification of Sleep Disorders Diagnostic and Coding Manual (ICSD-2), but there is debate about its classification, and its response to CPAP is unknown.

**Methods:** We present 7 consecutive patients presenting with catathrenia over a 5-year period. They were all young women, ranging in age from 20 to 34 years with a body mass index (BMI) <25. They underwent standard clinical evaluation, questionnaires, physical exam, craniofacial evaluations, and nocturnal polysomnography. All seven were titrated on continuous passive airway pressure (CPAP) treatment for sleep disordered breathing then offered surgical treatment if unable to tolerate or adhere to CPAP recommendations.

**Results:** Groaning was present throughout all stages of sleep. The mean (SD) AHI and RDI were 3.2 (0.56) and 13.1 (2.4) respectively. CPAP resolved groaning in all cases. 5 patients (71%) elected subsequent surgical intervention. Three of the 4 that followed up after surgery required adjuvant oral appliance treatment, but all four ultimately had resolution of groaning.

**Conclusions:** Catathrenia may have subtypes related to sleep stage specificity or presence of sleep disordered breathing. In our heterogeneous group of non-obese women with a normal AHI and elevated RDI, CPAP and select soft tissue surgeries of the upper airway (often augmented with an oral appliance) successfully treated nocturnal groaning.

**Keywords:** Catathrenia, parasomnia, NREM sleep, sleep disordered breathing, nasal CPAP, nomenclature

**Citation:** Guilleminault C; Hagen CC; Khaja AM. Catathrenia: parasomnia or uncommon feature of sleep disordered breathing? SLEEP 2008;31(1):132-139.
Long-Term Efficacy and Safety of Zolpidem Extended-Release 12.5 mg, Administered 3 to 7 Nights Per Week for 24 Weeks, in Patients With Chronic Primary Insomnia: A 6-Month, Randomized, Double-Blind, Placebo-Controlled, Parallel-Group, Multicenter Study

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Study Objectives: To evaluate long-term efficacy and safety of zolpidem extended-release 3 to 7 nights/week for chronic primary insomnia.

Design: Multicenter, 25-week, phase IIb, randomized, double-blind, placebo-controlled, parallel-group.

Setting: Outpatient; visits every 4 weeks.

Patients: Aged 18 to 64 years; DSM-IV criteria for chronic primary insomnia; ≥3 months of difficulty initiating or maintaining sleep or experiencing nonrestorative sleep.

Interventions: Single-dose zolpidem extended-release 12.5 mg (n = 669) or placebo (n = 349), self-administered from a minimum of 3 nights/week to a maximum of 7 nights/week.

Measurements and Results: Patient’s Global Impression (PGI) and Clinical Global Impression-Improvement (CGI-I) were assessed every 4 weeks up to week 24. Patient Morning Questionnaire (PMQ), recorded daily, assessed subjective sleep measures—sleep onset latency (SOL), total sleep time (TST), number of awakenings (NAW), wake time after sleep onset (WASO), and quality of sleep (QOS)—and next-day functioning. At week 12, PGI, Item 1 (aid to sleep), the primary endpoint, was scored as favorable (i.e., “helped me sleep”) by 89.8% of zolpidem patients vs. 51.4% of placebo patients (P < 0.0001, based on rank score) and at week 24 by 92.3% of zolpidem extended-release patients vs. 59.7% of placebo patients. Zolpidem extended-release also was statistically significantly superior to placebo at every time point for PGI (Items 1-4) and CGI-I (P < 0.0001, rank score), TST, WASO, QOS (P < 0.0001), and SOL (P ≤ 0.0014); NAW (Months 2-6; P < 0.0001). Sustained improvement (P < 0.0001, all time points) was observed in morning sleepiness and ability to concentrate (P = 0.0014, month 6) with zolpidem extended-release compared with placebo. Most frequent adverse events for zolpidem extended-release were headache, anxiety and somnolence. No rebound effect was observed during the first 3 nights of discontinuation.

Conclusions: These findings establish the efficacy of 3 to 7 nights per week dosing of zolpidem extended-release 12.5 mg for up to 6 months. Treatment provided sustained and significant improvements in sleep onset and maintenance and also improved next-day concentration and morning sleepiness.

Keywords: Zolpidem extended-release, randomized controlled trial, chronic insomnia, long-term, rebound, sleep maintenance

Citation: Krystal AD; Erman M; Zammit GK; Soubrane C; Roth T. Long-Term Efficacy and Safety of Zolpidem Extended-Release 12.5 mg, Administered 3 to 7 Nights Per Week for 24 Weeks, in Patients With Chronic Primary Insomnia: A 6-Month, Randomized, Double-Blind, Placebo-Controlled, Parallel-Group, Multicenter Study. SLEEP 2008;31(1):79-90.

Efficacy and Safety of As-Needed, Post Bedtime Dosing with Indiplon in Insomnia Patients with Chronic Difficulty Maintaining Sleep

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Objective: To evaluate the efficacy and tolerability of immediate release indiplon capsules in patients with chronic insomnia using an “as-needed” dosing strategy in response to difficulty falling back to sleep following a middle of the night, nocturnal awakening.

Methods: Adult outpatients (N=264; 71% female; age, 46 years) who met DSM-IV criteria for primary insomnia, with average total sleep time (TST) <6.5 hours and >8 nights in the past month with nocturnal awakenings, were randomized to 4 weeks of double-blind treatment with 10mg or 20mg indiplon capsules, or placebo. The primary endpoint was latency to sleep onset post-dosing after a middle of the night awakening (LSOpd). Secondary endpoints included patients’ subjective assessment of total sleep time (sTSTpd). Next day residual effects were evaluated by a 100mm Visual Analog Scale (VAS) rating of sleepiness.

Results: Both doses of indiplon significantly reduced LSOpd at all time-points. Compared to placebo (45.2 min), the 4-week least squares (LS) mean LSOpd was 36.5 min in the indiplon 10mg group (P=0.0023) and 34.4 min in the indiplon 20mg group (P<0.0001). The 4-week LS mean sTSTpd was higher in the indiplon 10mg group (253 min) and 20mg group (278 min) compared to placebo (229 min; P<0.01 for both comparisons). There was no increase observed in VAS ratings of next-day sleepiness for either dose of indiplon when compared to placebo. Indiplon was well-tolerated at both doses.

Conclusions: Patients with chronic insomnia with nocturnal awakenings achieved significant and sustained improvement in sleep parameters while utilizing an as-needed post bedtime dosing strategy with indiplon capsules. Indiplon was well-tolerated, with no self-rated, next-day residual effects.

Keywords: Insomnia, indiplon, sleep maintenance disorders, awakenings

Citation: Roth T; Zammit GK; Scharf MB; Farber R. Efficacy and safety of as-needed, post bedtime dosing with indiplon in insomnia patients with chronic difficulty maintaining sleep. SLEEP 2007;30(12):1731-1738.

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Sleep Disordered Breathing And Daytime Sleepiness Are Associated With Poor Academic Performance In Teenagers. A Study Using The Pediatric Daytime Sleepiness Scale (PDSS)

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Study Objectives: Inadequate sleep and sleep disordered breathing (SDB) can impair learning skills. Questionnaires used to evaluate sleepiness in adults are usually inadequate for adolescents. We conducted a study to evaluate the performance of a Spanish version of the Pediatric Daytime Sleepiness Scale (PDSS) and to assess the impact of sleepiness and SDB on academic performance.

Design: A cross-sectional survey of students from 7 schools in 4 cities of Argentina.

Measurements: A questionnaire with a Spanish version of the PDSS was used. Questions on the occurrence of snoring and witnessed apneas were answered by the parents. Mathematics and language grades were used as indicators of academic performance.

Participants: The sample included 2,884 students (50% males; age: 13.3 ± 1.5 years)

Results: Response rate was 85%; 678 cases were excluded due to missing data. Half the students slept <9 h per night on weekdays. The mean PDSS value was 15.74 ± 5.93. Parental reporting of snoring occurred in 511 subjects (23%); snoring was occasional in 14% and frequent in 9%. Apneas were witnessed in 237 cases (11%), being frequent in 4% and occasional in 7%. Frequent snorers had higher mean PDSS scores than occasional or nonsnorers (18 ± 5, 15.7 ± 6 and 15.5 ± 6, respectively; P < 0.001). Reported snoring or apneas and the PDSS were significant univariate predictors of failure and remained significant in multivariate logistic regression analysis after adjusting for age, sex, body mass index, specific school attended, and sleep habits.

Conclusions: Insufficient hours of sleep were prevalent in this population. The Spanish version of the PDSS was a reliable tool in middle-school-aged children. Reports of snoring or witnessed apneas and daytime sleepiness as measured by PDSS were independent predictors of poor academic performance.

Keywords: Sleepiness, pediatric daytime sleepiness scale, snoring, school outcome.

Citation: Perez-Chada D; Perez-Lloret S; Videla AJ; Cardinali D; Bergna MA; Fernández-Acquier M; Larrateguy L; Zabert GE; Drake C. Sleep disordered breathing and daytime sleepiness are associated with poor academic performance in teenagers. A study using the pediatric daytime sleepiness scale (PDSS). SLEEP 2007;30(12):1698-1703.

Practice Parameters for the Treatment of Narcolepsy and other Hypersomnias of Central Origin

An American Academy of Sleep Medicine Report

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These practice parameters pertain to the treatment of hypersomnias of central origin. They serve as both an update of previous practice parameters for the therapy of narcolepsy and as the first practice parameters to address treatment of other hypersomnias of central origin. They are based on evidence analyzed in the accompanying review paper. The specific disorders addressed by these parameters are narcolepsy (with cataplexy, without cataplexy, due to medical condition and unspecified), idiopathic hypersomnia (with long sleep time and without long sleep time), recurrent hypersomnia and hypersomnia due to medical condition. Successful treatment of hypersomnia of central origin requires an accurate diagnosis, individual tailoring of therapy to produce the fullest possible return of normal function, and regular follow-up to monitor response to treatment. Modafinil, sodium oxybate, amphetamine, methamphetamine, dextroamphetamine, methylphenidate, and selegiline are effective treatments for excessive sleepiness associated with narcolepsy, while tricyclic antidepressants and fluoxetine are effective treatments for cataplexy, sleep paralysis, and hypnagogic hallucinations; but the quality of published clinical evidence supporting them varies. Scheduled naps can be beneficial to combat sleepiness in narcolepsy patients. Based on available evidence, modafinil is an effective therapy for sleepiness due to idiopathic hypersomnia, Parkinson’s disease, myotonic dystrophy, and multiple sclerosis. Based on evidence and/or long history of use in the therapy of narcolepsy, the therapy of hypersomnias of central origin.

Keywords: Narcolepsy, idiopathic hypersomnia, recurrent hypersomnia, Parkinson’s disease, myotonic dystrophy, multiple sclerosis, modafinil, sodium oxybate, amphetamine, methamphetamine, dextroamphetamine, methylphenidate, selegiline, tricyclic antidepressants, fluoxetine

Citation: Morgenthaler TI; Kapur VK; Brown TM; Swick TJ; Alessi C; Aurora RN; Boehlecke B; Chesson AL; Friedman L; Maganti R; Owens J; Pancer J; Zak R; Standards of Practice Committee of the AASM. Practice parameters for the treatment of narcolepsy and other hypersomnias of central origin. SLEEP 2007;30(12):1705-1711.