

## B. Clinical Sleep Science - IX. Medical Disorders and Sleep

en metabolism and promote loss of kidney function in persons with chronic kidney disease (CKD). We examined cross-sectional relationships among measures of sleep, kidney function and glucose metabolism in persons with mild to moderate CKD.

**Methods:** In an ancillary study of 339 participants from the Chronic Renal Insufficiency Cohort (CRIC) Study, a prospective observational study of nearly 4,000 subjects with CKD, we estimated sleep duration and fragmentation using wrist actigraphy over 5 consecutive days. Participants also answered questions about snoring frequency. Outcome measures included estimated glomerular filtration rate (eGFR) derived from the MDRD equation (higher levels indicate better kidney function), fasting glucose levels, and insulin resistance estimated from the homeostatic model assessment (HOMA).

**Results:** The mean age (SD) was 59 (11) years, 53% were female, 47% were non-Hispanic white, 46% were non-Hispanic black, 47% had diabetes and 46% reported frequent snoring. Mean (SD) sleep duration was 6.2 (1.4) hours and mean sleep fragmentation was 23.5 (10.3)%. Means (SD) of outcome measures were: 37.4 (14.9) ml/min/1.73m<sup>2</sup> for eGFR, 112.9 (47.0) mg/dl for glucose, 6.5 (9.2) for HOMA. Regression models adjusting for age, race, sex and diabetes indicated that both sleep duration (beta = 1.25 ml/min/1.73m<sup>2</sup> per hour of sleep, P = 0.03) and fragmentation (beta = -2.71 ml/min/1.73m<sup>2</sup> per 10% of fragmentation, P = 0.001) were associated with eGFR. Greater sleep fragmentation was also significantly associated with higher fasting glucose (beta = 5.2 mg/dl per 10% of fragmentation, P = 0.026), and a trend for greater insulin resistance (beta = 0.9 per 10% of fragmentation, P = 0.066). Snoring was not associated with any of the outcomes.

**Conclusion:** Short and poor quality sleep were associated cross-sectionally with worse kidney function and disturbances in glucose metabolism among patients with CKD. The role of impaired sleep in the progression of CKD deserves further study.

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### 0864

#### CLINICAL SLEEP VARIABLES IN PATIENTS WITH PAINFUL DIABETIC PERIPHERAL NEUROPATHY

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**Introduction:** Diabetes Mellitus is a complex disease with many complications, including painful diabetic peripheral neuropathy (DPN). Patients with painful DPN often report that pain has a severe impact on their sleep and complaints such as insomnia and excessive daytime sleepiness are thought to be common in this patient group. Neuropathic pain, apnoeas and/or periodic limb movements (PLM) may all affect the quality of sleep. The aim was to investigate the prevalence of above factors and how they may interfere with sleep quality.

**Methods:** 83 type 1 and 2 diabetic patients (57 male, 26 female, mean age 65 ± 9 yrs, mean BMI 32kg/m<sup>2</sup>) with painful DPN entered the study. Clinical sleep was assessed using full polysomnography. Subjective pain was measured using the Brief Pain Inventory (BPI) and daytime sleepiness was assessed by the Karolinska Sleepiness Scale (KSS).

**Results:** Patients with painful DPN (mean pain severity of 3 ± 2) had a sleep efficiency of 78% ± 10.0%. Clinically, sleep was characterised by an apnoea/hypopnoea index (AHI) of 4 ± 5, with less than 1 (± 1) respiratory arousal/hour. Over 30% of patients had mild sleep apnoea (AHI > 5). Patients had a mean of PLM index of 18 ± 20 and 40% of patients had an index > 15. Only 2 ± 2 PLM/hour were associated with arousals. Patients reported an average daytime sleepiness score (KSS) of 5 (± 2).

**Conclusion:** The results suggest that the sleep of patients with painful DPN is poor. The PLM index was clinically significant in 40% of the patients and over 30% of patients had mild sleep apnoea. The incidence of both apnoeas and PLMs is higher than reported in the normal population. There was no association however between clinical sleep variables and arousals. It is therefore likely that diabetes and/or neuropathic pain is contributing to the poor sleep seen in these patients.

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### 0865

#### HOW DO SLEEP BEHAVIORS AND VALUES RELATE TO PERCEIVED SLEEP QUALITY AND HEALTH OUTCOMES

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**Introduction:** Even though public awareness of sleep has increased recently, the association between value on sleep and sleep behaviors is uncertain. To date, there is a paucity of direct measures of sleep related behaviors which may be of critical importance in relation to numerous negative health outcomes. The current study demonstrates the relationship between sleep behaviors and perceived sleep quality and health outcomes.

**Methods:** This analysis includes 34 completed participants (Mean age = 38.6, 35% male, 71% college degree). Sleep-related behaviors (SB) significantly predicted sleep quality estimates on the PSQI (F = 51.8, P < .001) and accounted for 62% of the variance. Using a split-median to divide the sample into good and bad sleep behaviors groups (GsB and BsB, respectively), the BsB group has a history of significantly more adverse health consequences such as chronic pain, depression, and anxiety (all P < .05) as well as increased stress scores (P < .05). Interestingly, sleep values related to an individual's most relevant health consequences did not differ between the two sleep behavior groups.

**Results:** Sleep behavior highly predicts perceived sleep quality; however sleep behavior is not related to the value placed on sleep relative to personally salient health outcomes. These results illustrate the need for public education regarding sleep-promoting behaviors as those individuals who highly value sleep are not engaging in healthy sleep practices.

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### 0866

#### SCREENING FOR SLEEP DISORDERS IN PRIMARY CARE: PRESENCE OF MEDICAL CONDITIONS ASSOCIATED WITH SLEEP APNEA

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**Introduction:** It is well established that sleep apnea is associated with a constellation of medical conditions including cardiovascular disease (CD), hypertension (HT), diabetes (DI), hyperlipidemia (HL), and overweight/obesity (OB). The goal of this prospective study was describe the presence of these medical conditions in primary care patients with no known history of sleep disorders, and to screen them for sleep apnea.

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**Methods:** 53 volunteer patients were recruited from two primary care settings, with a mean age of 54.3 years (sd = 12.1). During their appointment, their doctor indicated the presence of any of the targeted medical conditions (CD, HT, DI, HL, OB). All patients completed an overnight polysomnogram to screen for sleep apnea.

**Results:** The frequencies of patients in each medical condition (MC) category were as follows: No MC (n = 17), 1 or 2 MCs (n = 22), and 3 or more MCs (n = 14), and are presented in a Venn diagram. Those with one or more medical conditions (n = 36) tended to have a higher mean Respiratory Distress Index (RDI = 32.6, sd = 29.7) than those with no medical conditions (n = 16, RDI = 18.1, sd = 13.6). Organising the subjects according to medical conditions (MC Yes/No) and RDI (using 19.9 as the cutoff between low and high) also shows an interesting trend, where 41.5% of participants fell in the Yes MC/High RDI category, and only 17% fell into the No MC/Mild RDI category.

**Conclusion:** Screening for sleep apnea in primary care may be improved by attention to medical conditions in addition to patient symptom reports. The study is important as it uses a prospective approach, starting with patients in primary care without a known history of sleep disorder, and following them through a laboratory screening.

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### 0867

#### FACTORS ASSOCIATED WITH A POSITIVE STOP-BANG SCREEN IN THE PREOPERATIVE CLINIC POPULATION

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**Introduction:** Many preoperative clinics use the STOP-Bang Questionnaire as a screening tool for obstructive sleep apnea considering data that suggests obstructive sleep apnea predisposes to increased postoperative complications. Factors associated with obstructive sleep apnea include but are not limited to age, gender, BMI > 35 kg/m<sup>2</sup>, hypertension, hyperlipidemia, and diabetes. Factors associated with positive STOP-Bang screening need clarification.

**Methods:** We analyzed STOP-Bang scores collected on 996 patients in the Virginia Commonwealth University (VCU) preoperative clinic over a 6 week period. A score greater than or equal to three defined a positive STOP-Bang screening. In addition to the STOP-Bang score, we collected data regarding age, gender, race, BMI and other co-morbidities including those most commonly associated with obstructive sleep apnea.

**Results:** We found that 43.3% of preoperative patients scored positive on the STOP-Bang Questionnaire. Increasing body mass index demonstrated a direct, linear correlation of 0.982 with increasing STOP-Bang, ultimately contributing to STOP-Bang positive patients averaging 38.9 kg/m<sup>2</sup>. A positive STOP-Bang screen yielded an average age of 57.6 years compared with 48.9 years seen in those with a negative screen. Among co-morbid conditions, renal disease exhibited the highest STOP-Bang positivity with 67.9%, followed by diabetes (66.9%) and hypertension (65.3%). Sixty-seven percent of preoperative patients presenting for gastric bypass surgeries scored positive on STOP-Bang.

**Conclusion:** STOP-Bang positivity demonstrates associations similar to co-morbid conditions identified in obstructive sleep apnea. Specifically, these include increased body mass index, average age and the presence of renal disease, diabetes and hypertension. Based on the above findings, one could speculate that patients scoring positive on STOP-Bang, regardless of a sleep apnea diagnosis, exhibit similar increased risks of associated postoperative complications.

### 0868

#### INFLUENCE OF COUNTRY OF ORIGIN ON THE ASSESSMENT OF DAYTIME SLEEPINESS: ANALYSIS OF THE CAATCH DATA

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**Introduction:** This study assessed the influence of country of origin on subjective daytime sleepiness among hypertensive blacks, participating in the Counseling African-Americans to Control Hypertension (CAATCH) Trial.

**Methods:** Data from the present study emanated from the CAATCH study, a multi-level intervention to improve blood pressure control among hypertensive blacks. Specific details on study design and methodology are published elsewhere (Circulation 2009;2:249-256). The present analysis focuses on baseline data, which includes socio-demographic, medical history, and daytime sleepiness assessed with the Epworth sleepiness scale (ESS); a cut-off score of  $\geq 10$  was used to classify EDS. Participants were diagnosed with hypertension and were receiving antihypertensive medications. All provided informed consent under the supervision of the IRB at New York University Medical Center. Data were coded and analyzed by an experienced statistician using SPSS 15.0.

**Results:** A total of 1059 participants provided baseline data for the analysis; 73% were US-born blacks (UBB), 27% were foreign-born blacks (FBB). There were no significant group differences in term of age (UBB =  $56 \pm 13$ ; FBB =  $58 \pm 13$ ), gender (UBB female = 71%, FBB females = 73%). However, FBB participants were more likely to be employed (45% vs. 29%;  $\chi^2 = 20$ ,  $P < 0.0001$ ), but less likely to have received more than a high school education (FBB = 23% vs. 31%;  $\chi^2 = 24$ ,  $P < 0.0001$ ), less likely to report alcohol consumption (18% vs. 39%;  $2 = 39$ ,  $P < 0.0001$ ), and less likely to report a smoking history (24% vs. 63%;  $\chi^2 = 114$ ,  $P < 0.0001$ ). Logistic regression analyses showed that UBB participants were twice as likely as their FBB counterparts to exhibit EDS (OR = 1.85, 95% CI:1.5-2.73,  $P < 0.01$ ); effects of age, sex, education, history of smoking and/or education were adjusted in the model.

**Conclusion:** Results of the study demonstrate the importance of considering country of origin in the analysis of the epidemiologic sleep data. Future studies should assess whether UBB are at greater risk for sleep problems (e.g., sleep apnea) associated with daytime sleepiness.

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### 0869

#### WHAT CAN EYE IMAGING TECHNIQUES REVEAL ABOUT UNDIAGNOSED SLEEP DISTURBANCES?

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**Introduction:** There have been several case series and prevalence studies which have documented a relationship between various eye disorders, such as glaucoma, floppy eyelid syndrome, and optic neuropathy with obstructive sleep apnea (OSA). However, there has been