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Authors

Stone, KL
Blackwell, T
Schneider, JL
et al.

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wish to thank the state of Michigan for use of the MDS data set.

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Impaired Sleep Increases the Short-Term Risk of Mortality in Older Women: Preliminary Results from a Prospective Actigraphy Study

Stone KL,[1] Blackwell T,[2] Schneider JL,[2] Ancoli-Israel S,[3] Redline S,[4] Cauley JA,[5] Ensrud KE,[6] Hillier TA,[7] Mangione CM,[8] Cummings SR[2,1]
(1) University of California, San Francisco, San Francisco, CA, USA, (2) California Pacific Medical Center Research Institute, San Francisco, CA, USA, (3) University of California, San Diego, San Diego, CA, USA, (4) Case Western Reserve University, Cleveland, OH, USA, (5) University of Pittsburgh, Pittsburgh, PA, USA, (6) University of Minnesota, Minneapolis, MN, USA, (7) Kaiser Permanente Center for Health Research Northwest/Hawaii, Portland, OR, USA, (8) Univeristy of California, Los Angeles, Los Angeles, CA, USA

Introduction: Previous large epidemiologic studies have reported associations between self-reported sleep and nap habits and risk of mortality. In particular, most studies have found that self-reported long sleepers (e.g. more than eight hours per night) and those reporting frequent or daily naps were at significantly higher risk of mortality as compared to those reporting more usual sleep patterns. However, our study is the first to examine the relationship between objective measures of sleep and nap habits, obtained using wrist actigraphy, and subsequent risk of death in older women, using data collected from the multi-center Study of Osteoporotic Fractures (SOF).
Methods: During the SOF baseline examination (1986-88), 9,704 women aged 65 and older were enrolled at four participating US clinic sites. The cohort was enhanced with an additional 662 African American participants aged ≥ 70 years approximately 10 years later. During an eighth round of clinic visits (Visit 8) beginning in 2001, sleep patterns were assessed by wrist actigraphy (SleepWatch-O®, Ambulatory Monitoring, Inc.) in 3,110 women aged 80 and older. Actigraphs were worn on the non-dominant wrist for an average of 4.1 nights (SD=0.82 nights). Deaths that occurred after Visit 8 (mean follow-up approximately 1.1 years) were ascertained by tri-annual contact with participants (if alive) or their next of kin, and confirmed using death certificates. Using logistic regression models, we determined the association between measures of sleep quality and short-term risk of mortality, after controlling for age, BMI, race, health status, comorbidities, depression, cognitive function, and use of sleep medications.
Results: Complete data on actigraphy and all covariates are available in 2,791 women, among whom 54 (1.9%) have died. Preliminary results suggest a U-shaped association between total sleep time and mortality: short sleepers (≤ 4 hours per night) were at 2.7 fold increased risk of death compared to those sleeping an average of 6-8 hours per night (Relative Risk=2.7; 95% CI=1.3 - 5.7); whereas long sleepers (> 8 hours per night) experienced a 2.6-fold increase in risk of death (RR=2.6; 1.0 - 6.6). Each 10% decrease in sleep efficiency (% of time in bed spend sleeping) was associated with a 21% increase in risk of mortality (RR=1.21; 1.07 - 1.38). The association between daytime napping and risk of mortality was more modest, indicating a 6% increase in risk of mortality per each additional 1 hour per week of napping (RR=1.06; 1.03 - 1.09).
Conclusion: Preliminary results from SOF indicate that older women with poor sleep quality are at significantly greater short-term risk of mortality as compared to those with more normal sleep patterns, even after accounting for potential contributing factors such as age, BMI, race, health status, comorbidities, depression, cognition, and use of sleep medications. Interestingly, both short and long sleep duration are associated with significantly higher risk of death. While further research is needed to elucidate the mechanisms for these associations, these preliminary results suggest that treatments to improve sleep quality in older

women may enhance their survival.

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Characteristics of Objective and Subjective Sleep in Older Women: The Study of Osteoporotic Fractures (SOF)

Schneider J,[1] Blackwell T,[1] Hillier TA,[2] Stone KL[3]
(1) California Pacific Medical Center Research Institute, San Francisco, CA, USA, (2) The Kaiser Permanente Center for Health Research Northwest/Hawaii, Portland, OR, USA, (3) University of California, San Francisco, San Francisco, CA, USA

Introduction: The prevalence of sleep disorders increases with age and sleep disorders are increasingly recognized as contributing to poor health in the elderly. Previous studies have been limited by either self-reported measures or by small sample size. This is the first large prospective study of elderly community-dwelling women to assess correlates of sleep using both self-report data and wrist actigraphy.
Methods: The Study of Osteoporotic Fractures (SOF), is an ongoing prospective study of older women that enrolled 9704 community-dwelling ambulatory women aged ≥ 65 at 4 US clinical centers in 1986-1988 and enhanced the cohort with 662 African American women aged >70 approximately 10 years later. This analysis uses data from the eighth visit (Year 16) to characterize sleeping habits and correlates of sleep among women that completed a questionnaire (n=4404) and the subset of women that also completed wrist actigraphy (n=3110) with SleepWatch-O®. Actigraphy data include total sleep time (TST), sleep efficiency (% time in bed spent sleeping(SE)), long wake episodes (LWEP, number wake episodes >5 min duration), and total napping time (TNAP). Self-reported sleep and nap habits were obtained by questionnaire in the entire cohort, including the Pittsburgh Sleep Quality Index (PSQI), Functional Outcomes of Sleep Questionnaire (FOSQ), and Epworth Sleepiness Scale (ESS). Using linear regression models, we examined the cross-sectional association between self-reported sleep habits and actigraphy data and a set of covariates, including age, race, medical conditions, cognitive function, and depression at Year 16.
Results: We found indications of significant subjective and objective sleep impairment in our cohort (mean age 84.1 years; 90% White). Actigraphy results indicate that 8% of women (n=251) slept ≥ 8 hrs per night, 18% slept <4 hours. 29% (n=889) had ≥ 80% SE and 32% had <60% SE. 30% (n=915) had ≥ LWEP per night and 29% (n=911) had <5. 8% (n=237) napped >2 hours per day and 46% (n=1420) nap <30 minutes per day. The mean TST was 5.7 hours (SD=1.9), mean SE was 66% (SD=20.2), 6.6 LWEP on average per evening (SD= 2.7), and an average of 48 minutes per day (SD=52) were spent napping. TST did not differ in women >90 years (referent <90) (p=0.61). There was a difference for LWEP (p=0.009), SE (p=0.003) and nap time (p=0.003) by age group, older women napped more, had poorer SE, and more LWEP. Self-reported data indicate that 4% (n=99) experience cessation of breathing during sleep, 1% (n=47) have been diagnosed with sleep apnea, 7% (n=285) diagnosed with a sleep disorder other than sleep apnea(146 insomnia, 172 restless leg syndrome (RLS)). 58% (n=1660) have ever snored, 88% (n=1463) of the snorers snore >=3 nights each week. The Mean ESS score was 5.7, 21% (N=927) suffer from excessive daytime sleepiness (ESS score >9). Mean PSQI score was 6.3, 51% were defined as poor sleepers (PSQI score >5) and mean FOSQ score was 15.3. The strongest determinants of sleep defined by both actigraphy and self-reported sleep habits overlapped and included age, BMI, exercise, anxiety, depression, cognitive function, heart conditions, and Alzheimers disease.
Conclusion: Many lifestyle factors and co-morbidities are associated