

Low Sleep Quality Linked to Dementia Pathology

Sue Hughes | December 11, 2014

Low levels of oxygen saturation during sleep and reduced durations of slow-wave sleep are both associated with more brain pathology characteristic of dementia, a new study shows.

In the study, published online in *Neurology* December 10, elderly men with lower levels of oxygen saturation during sleep had more brain microinfarcts, the major lesion of vascular dementia, while those with less slow-wave sleep had more brain atrophy at autopsy.

Furthermore, decline in cognitive scores during follow-up was attenuated among men with higher levels of slow-wave sleep, suggesting that this type of sleep may protect against cognitive decline, possibly through a reduction in brain atrophy, the researchers note.

"Getting a good night's sleep has more benefits than we might think. It may protect against dementia," lead author Rebecca P. Gelber, MD, Veterans Affairs Pacific Islands Health Care System, Honolulu, Hawaii, told *Medscape Medical News*.

She believes doctors need to be aware that how people sleep can affect brain function. "If patients have a disease that causes low oxygenation such as COPD [chronic obstructive pulmonary disease] or heart failure they may have a lower threshold for memory impairment. This is another reason to intervene in sleep apnea and to keep oxygen levels higher."

Dr Gelber said slow-wave sleep is more difficult to influence. "But it does seem to play a restorative role in brain function, and may reduce processes that lead to generalized atrophy of the brain. We need more research on the predictors of slow-wave sleep," she added.

A Good Night's Sleep

For the current study, Dr Gelber and colleagues analyzed data from 167 elderly Japanese-American men (mean age, 84 years) who, as part of the Honolulu-Asia Aging Study, underwent a sleep study in their own homes during 1999–2000 and later died and underwent autopsy before 2010. They specifically looked at sleep characteristics measured by polysomnography and whether any of these were associated with brain lesions at autopsy.

Participants who had oxygen saturation levels less than 95% had more microinfarcts. Specifically, when divided into quartiles according to sleep time with saturated oxygen levels below 95%, those in the top quartile (the longest time at low oxygen levels) had almost four times more microinfarcts than those in the lowest quartile (odds ratio [OR], 3.88; 95% confidence interval [CI], 1.10 - 13.76).

Higher oxygen saturation during rapid eye movement sleep was also associated with less gliosis and neuronal loss in the locus ceruleus.

Greater slow-wave sleep duration was associated with less generalized atrophy (adjusted OR, 0.32; 95% CI, 0.10 - 1.03), again comparing highest to lowest quartiles of percentage sleep in slow-wave sleep.

More Slow Wave Sleep, Less Cognitive Decline

Cognitive assessments were conducted at regular intervals using the 100-point Cognitive Abilities Screening Instrument (CASI), and these showed that cognitive scores declined less among men with greater slow-wave sleep.

The authors point out: "The observed associations remained consistent adjusting for potential confounders and excluding participants who died early in follow-up and those with lower baseline cognitive scores, supporting the inference that the sleep features may have preceded the development of the lesions."

One puzzling finding was that lower oxygen saturation during sleep was associated with fewer Lewy bodies on autopsy. "This...finding is unexpected and warrants additional study," the researchers say.

The current study found no associations between sleep features and Alzheimer's lesions, but Dr Gelber and colleagues point out that other studies have suggested a link between sleep quality and Alzheimer's, with the *APOE* ε4 allele being associated with obstructive sleep apnea, and the adverse cognitive effects of sleep apnea shown to be worse among allele carriers.

"Our findings suggest that hypoxia during sleep and reductions in [slow wave sleep] may contribute to the major pathologic processes underlying cognitive decline in the elderly," the researchers conclude.

They add, "How [slow wave sleep] may have a restorative role in brain function, and whether prevention of nocturnal hypoxia may reduce the risk of cognitive decline, require additional investigation."

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