Pre-sleep drinking disrupts sleep

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For individuals who drink before sleeping, alcohol initially acts as a sedative - marked by the delta frequency electroencephalogram (EEG) activity of Slow Wave Sleep (SWS) - but is later associated with sleep disruption. Significant reductions in EEG delta frequency activity and power also occur with normal development between the ages of 12 and 16; likewise this is a time when alcohol is commonly consumed for the first time, with dramatic increases in drinking occurring among collage-age individuals. A study of the effects of alcohol on sleep EEG power spectra in college students has found that pre-sleep drinking not only causes an initial increase in SWS-related delta power but also causes an increase in frontal alpha power, which is thought to reflect disturbed sleep.

Results will be published in the February 2015 online-only issue of *Alcoholism: Clinical & Experimental Research* and are currently available at Early View.

"People likely tend to focus on the commonly reported sedative properties of alcohol, which is reflected in shorter times to fall asleep, particularly in adults, rather than the sleep disruption that occurs later in the night," said Christian L. Nicholas, National Health & Medical Research Council Peter Doherty Research Fellow in the Sleep Research Laboratory at The University of Melbourne as well as corresponding author for the study.

"The reduction in delta frequency EEG activity we see across the ages is thought to represent normal brain maturational processes as the

adolescent brain continues to develop to full maturity," said Nicholas. "Although the exact function of non-Rapid Eye Movement (NREM) sleep, and in particular SWS, is a topic of debate, it is thought to reflect sleep need and quality; thus any disruption to this may affect the underlying restorative properties of sleep and be detrimental to daytime functioning."

Nicholas and his colleagues recruited 24 participants (12 female, 12 male), healthy 18- to 21-year-old social drinkers who had consumed less than seven standard drinks per week during the previous 30 days. Each participant underwent two conditions: pre-sleep alcohol as well as a placebo, followed by standard polysomnography with comprehensive EEG recordings.

Results showed that alcohol increased SWS delta power during NREM. However, there was a simultaneous increase in frontal alpha power.

"For individuals researching sleep in the field of alcohol studies," said Nicholas, "our findings indicate that care needs to be taken when interpreting increases in 'visually scored' SWS associated with alcohol consumption. Increases in SWS, which traditionally would be interpreted as a good thing, can be associated with more subtle changes indicating disrupted sleep, such as the increases we observed in alpha activity, which are revealed when more detailed micro-structural components of the sleep electroencephalogram are assessed."

Nicholas explained that the increase in frontal alpha power that occurs as a result of pre-sleep drinking likely reflects a disruption of the normal properties of NREM slow wave sleep.

"Similar increases in alpha-delta activity, which are associated with poor or unrefreshing sleep and daytime function, have been observed in individuals with chronic pain conditions," he said. "Thus, if sleep is

being disrupted regularly by pre-sleep alcohol consumption, particularly over long periods of time, this could have significant detrimental effects on daytime wellbeing and neurocognitive function such as learning and memory processes."

Alcohol is not a sleep aid, said Nicholas. "The take-home message here is that alcohol is not actually a particularly good sleep aid even though it may seem like it helps you get to sleep quicker. In fact, the quality of the sleep you get is significantly altered and disrupted."

More information: "The Acute Effects of Alcohol on Sleep Electroencephalogram Power Spectra in Late Adolescence," *Alcoholism: Clinical & Experimental Research*, 2015.

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