Correcting delayed circadian phase with bright light therapy predicts improvement in ADHD symptoms: A pilot study

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Abstract

Attention-deficit/hyperactivity disorder (ADHD) is a common condition with comorbid insomnia reported in >70% of children and adults. These patients demonstrate delays in sleep-wake rhythms, the nocturnal rise in melatonin, and early morning rise in cortisol. Given that standard psychopharmacologic treatments for ADHD often do not completely control symptoms in participants with circadian rhythm delay, we sought to test whether bright light therapy (BLT) advances circadian rhythms and further reduces ADHD symptoms over standard treatments. In addition to standard of care, participants with ADHD diagnosis underwent 1 week of baseline assessment followed by 2-weeks of 30-minute morning 10,000-lux BLT beginning 3 h after mid-sleep time. Participants minimised overhead light after 4 pm, wore an actigraphy watch, and recorded BLT time on daily sleep logs. Dim Light Melatonin Onset (DLMO) was assessed at baseline and after 2-week treatment. ADHD symptoms were measured by the ADHD-Rating Scales (ADHD-RS). BLT significantly advanced the phase of DLMO by 31 min [mean time (SEM), 20:36 (0:21) advanced to 20:05 (0:20)] and mid-sleep time by 57 min [4:37 (0:22) advanced to 3:40 (0:16); paired t-tests, p = 0.002 and 0.004, respectively]. Phase advances (in DLMO or mid-sleep time) were significantly correlated with decreased ADHD-RS total scores (p = 0.027 and 0.044) and Hyperactive-Impulsive sub-scores (p = 0.014 and 0.013, respectively). Actigraphy analysis for a subset of 8 participants with significant DLMO phase advance revealed no significant changes in total sleep time, sleep efficiency, wake after sleep onset, or percent wake during the sleep interval. This is the first successful use of BLT for advancing melatonin phase and improving ADHD symptoms in adults. BLT may be a complementary treatment for both delayed sleep timing and ADHD symptoms in adults.