Light therapy

Teen delayed circadian rhythm review.

Melatonin/retinal input. Opaque scale on heads of lizards.

bright light in specific wavelengths can shift the internal body clock and regulate sleep patterns when used for 15 to 30 minutes upon waking. A teen can reset his or her internal clock by receiving bright light exposure and thereby assist the body in suppressing melatonin during the day,

Patients: in Australia

49 adolescents (mean age 14.6 ± 1.0 y, 53% males) diagnosed with Delayed Sleep Phase Disorder; mean chronicity 4 y 8 months; 16% not attending school. Eighteen percent of adolescents dropped out of the study (CBT plus BLT: $N = 23$ vs WL: $N = 17$). 89% had electronic media in bedroom—66% cellphone.

Interventions:

CBT plus BLT consisted of 6 individual sessions, including morning bright light therapy to advance adolescents' circadian rhythms, and cognitive restructuring and sleep education to target associated insomnia and sleep hygiene.

Measurements and Results:

DSPD diagnosis was performed via a clinical interview and 7-day sleep diary. Measurements at each time-point included online sleep diaries and scales measuring sleepiness, fatigue, and depression symptoms. Compared to WL, moderate-to-large improvements ($d = 0.65$-1.24) were found at post-treatment for CBT plus BLT adolescents, including reduced sleep latency, earlier sleep onset and rise times, total sleep time (school nights), wake after sleep onset, sleepiness, and fatigue. At 6-month follow-up ($N = 15$), small-to-large improvements ($d = 0.24$-1.53) continued for CBT plus BLT adolescents, with effects found for all measures. Significantly fewer adolescents receiving CBT plus BLT met DPSD criteria at post-treatment (WL = 82% vs. CBT plus BLT = 13%, $P < 0.0001$), yet 13% still met DSPD criteria at the 6-month follow-up.

Conclusions:

CBT plus BLT for adolescent DSPD is effective for improving multiple sleep and daytime impairments in the immediate and long-term. Studies evaluating the treatment effectiveness of each treatment component are needed.

2011 Univ of Leipzig, Germany

Method: The randomized trial included 28 inpatients (18 females and 10 males) between 14 and 17 years old with depressive complaints. The study was conducted between February and December of 2010 in Rodewisch, Germany. Half of the patients (n = 14) first received placebo (50 lux) 1 hour a day in the morning from 9:00 am to 10:00 am for 1 week and then received bright light therapy (2,500 lux) for 1 week in the morning from 9:00 am to 10:00 am. The other half (n = 14) first received bright light therapy and then received placebo. Patients were encouraged to continue ongoing treatment (fluoxetine 20 mg/day and 2 sessions of psychotherapy/week) because there were no changes in medication/dosage and psychotherapy since 1 month before the 4-week study period. For assessment of depressive symptoms, the Beck Depression Inventory (BDI) was administered 1 week before and 1 day before placebo treatment, on the day between placebo and bright light treatment, and on the day after and 1 week after bright light treatment. Saliva samples of melatonin and cortisol were collected at 8:00 am and 8:00 pm 1 week before and 1 day before placebo treatment, on the day between placebo and bright light treatment, on the day after bright light treatment, and 1 week after bright light treatment and were assayed for melatonin and cortisol to observe any change in circadian timing.

Results: The BDI scores improved significantly (P = .015). The assays of saliva showed significant differences between treatment and placebo for evening melatonin (P = .040). No significant adverse reactions were observed.

Conclusions: Antidepressant response to bright light treatment in this age group was statistically superior to placebo.

2012, Univ of Leipzig, Germany

Background. Bright light therapy, an effective therapeutic option for depressive adults, could provide safe, economic, and effective rapid recovery also in adolescents. *Methods.* **Twenty-eight volunteers, between 14 and 17 years old and suffering from mild depressive disorder according to DSM-IV criteria, completed the study.** This was a randomized cross-over trial, i.e. that 14 patients received first placebo (50 lux) for 1 h a day for 1 week and then bright light therapy (2,500 Lux) for 1 week. Fourteen patients received first bright light therapy and then placebo. For assessment of depressive symptoms, Beck's depression inventory scales were administered 1 week before and 1 day before placebo treatment, on the day between placebo and verum treatment, on the day after verum treatment and 1 week after verum treatment. Saliva melatonin and cortisol samples were collected at 08:00 and 20:00 h, 1 week before and 1 day before placebo treatment, on the day between placebo and verum treatment, on the day after verum treatment and 1 week after verum treatment and assayed for melatonin and cortisol to observe any change in circadian timing**. *Results.* BDI scores improved significantly. The assays of saliva showed significant differences between treatment and placebo. No significant adverse reactions were observed. *Conclusion.* Antidepressant response to bright light treatment in this age group was statistically superior to placebo.**

2013: One RCT of children and adolescents with SAD showed that 1 week of light therapy

significantly decreased parent-rated depressive symptoms [29]. A more recent 1-week trial of light therapy as an adjunctive treatment for young people with mild depression showed significant improvements in depression scores on the Beck Depression Inventory (BDI) from baseline to the end of therapy in the active treatment group [30]; however, participants received concomitant CBT and pharmacotherapy during the trial, which may have led to additional positive effects

TMS IN ADOLESCENTS:

2011 METHOD:

This prospective, open, multicenter trial of active **adjunctive rTMS** was conducted with 8 adolescents with DSM-IV-TR major depressive disorder (MDD) that had not responded sufficiently to 2 adequate antidepressant medication trials. All subjects were **maintained on a stable dose of a selective serotonin reuptake inhibitor** during the trial. **Thirty daily rTMS treatments were given 5 days per week** over 6 to 8 weeks. rTMS was applied to the left dorsolateral prefrontal cortex (120% of motor threshold; 10 Hz; 4-second trains; 26-second intertrain interval; 75 trains) for a total of 3,000 stimulations per treatment session.

RESULTS:

Seven of 8 adolescents completed all 30 treatments. rTMS was well tolerated, and no significant safety issues were identified. Suicidal ideation was present at baseline in 3 of the adolescents, and it improved during treatment. The primary outcome measure was the Children's Depression Rating Scale-Revised (CDRS-R); results improved significantly from baseline (mean [SD]) **(65.9** [6.6]) to treatment 10 (**50.9** [12]), $P < .02$. The CDRS-R scores continued to improve through the rTMS treatment series at treatment 20 (**40**.1 [14]), $P < .01$; treatment 30 (**32.6** [7.3]), $P < .0001$; and at **6-month follow-up (32.7** [3.8]), $P < .0001$.

2014 literature review: Methods

A systematic review was conducted in accordance with PRISMA guidelines. The databases of OVID PsycINFO, PubMed, Ovid Medline and Web of Science were searched for research utilizing rTMS treatment with adolescents experiencing depressive symptomology.

Results

The review identified seven studies that examined rTMS as a treatment for depressive symptomology in adolescence. Findings indicate rTMS is likely to be an effective treatment for young people with preliminary longitudinal results suggesting maintenance of effects 3 years post-treatment. Reported side effects have included headaches, scalp discomfort and single incidences of hypomania and seizure. All side effects were transitory and did not recur.

Mayo Clinic 2013:

Methods: Eighteen patients (mean age, 16.2 ± 1.1 years; 11 females, 7 males) with MDD who failed to adequately respond to at least one antidepressant agent were enrolled in the study. Fourteen patients completed all 30 rTMS treatments (5 days/week, 120% of motor threshold, 10 Hz, 3,000 stimulations per session) applied to the left dorsolateral prefrontal cortex. Depression was rated using the Children's Depression Rating Scale-Revised. Neurocognitive evaluation was performed at baseline and after completion of 30 rTMS treatments with the Children's Auditory Verbal Learning Test (CAVLT) and Delis–Kaplan Executive Function System Trail Making Test.

Results: Over the course of 30 rTMS treatments, adolescents showed a substantial decrease in depression severity. Commensurate with improvement in depressive symptoms was a statistically significant improvement in memory and delayed verbal recall. Other learning and memory indices and executive function remained intact. Neither participants nor their family members reported clinically meaningful changes in neurocognitive function.