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Brief report

The duration of light treatment and therapy outcome in seasonal affective disorder

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ABSTRACT

Background: Seasonal affective disorder (SAD) is characterized by recurrent episodes of major depression with a seasonal pattern, treated with light therapy (LT). Duration of light therapy differs. This study investigates retrospectively whether a single week of LT is as effective as two weeks, whether males and females respond differently, and whether there is an effect of expectations as assessed before treatment. **Methods:** 83 women, and 25 men received either one-week ($n=42$) or two weeks ($n=66$) of LT were included in three studies. Before LT, patients' expectations on therapy response were assessed.

Results: Depression severity was similar in both groups before treatment ($F(1,106)=0.19$ ns) and decreased significantly during treatment (main effect "time" $F(2,105)=176.7$, $p < 0.001$). The speed of therapy response differs significantly in treatment duration, in favor of 1 week ($F(2,105)=3.2$, $p=0.046$). A significant positive correlation between expectations and therapy response was found in women ($\rho=0.243$, $p=0.027$) and not in men ($\rho=-0.154$, ns). When expectation was added as a covariate in the repeated-measures analysis it shows a positive effect of the level of expectation on the speed of therapy response ($F(2,104)=4.1$, $p=0.018$).

Limitations: A limitation is the retrospective design.

Conclusions: There is no difference between 1 and 2 weeks of LT in overall therapy outcome, but the speed of therapy response differed between 1 week LT and 2 weeks LT. Together with the significant correlation between expectations and therapy response in women, we hypothesize that expectations play a role in the speed of therapy response.

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1. Introduction

Seasonal affective disorder (SAD) is a mood disorder characterized by recurrent episodes of major depression with a seasonal pattern (Rosenthal et al., 1984). SAD has a prevalence of 2–10% in Europe and North America (Mersch et al., 1999). Light therapy (LT) is the treatment of first choice for winter type SAD in the The Netherlands (Spijker et al., 2013). The effectiveness of LT is well established; response rates are high with minor adverse events (Golden et al., 2005; Lam et al., 2006). However, there is no consensus on the duration of treatment required to be effective; treatment duration ranges from 3 days to 8 weeks (Eastman et al., 1998; Lam et al., 2006; Meesters et al., 1994; Terman and Terman, 2005). Levitt and Levitan

indicate that a shorter duration of LT (2 weeks) can be as effective as a longer duration (5 weeks), suggesting a faster response rate in the group receiving shorter LT duration (Levitt and Levitan, 2003). Prior to the observed faster response, the expectations of the two patient groups regarding the speed of the response might have differed and this difference might have played a role in the faster response rate in the group that received 2 weeks of LT. This fits with previous findings that a positive expectation about response rate at the start of a therapy is related to therapy outcome (Eastman, 1990). Since there are indications outside the field of light treatment that expectations may differ between men and women, we included sex as an independent parameter into our analysis (Robinson et al., 2001).

In a database of studies with either 1 week or 2 weeks of light therapy we retrospectively analyzed the relationship between expectations of patients on therapy response with therapy response itself and the relationship with treatment duration and also to sex differences in expectations related to outcome.

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2. Material and methods

2.1. Study design and participants

For the current analysis we combined data obtained from three different studies, performed over a time span of 7 years (2005–2011). The studies were all performed in the SAD outpatient clinic of the University Medical Center Groningen (UMCG), The Netherlands. In two studies patients were treated with 2 weeks of light therapy (LT), in one study patients were treated with 1 week of LT. Patients received LT on five workdays each week. The choices for either 2 weeks or 1 week of treatment were made prior to the start of the separate studies, hence the choice between one week or two weeks of LT was made based on the research protocol of that specific study.

The first study compared blue-enriched light (for either 30 or 20 min) to standard full spectrum (30 min) over a period of two weeks (Gordijn et al., 2012). The second study compared low-intensity blue-enriched light to standard light treatment over a period of two weeks (Meesters et al., 2011). The third study compared low-intensity narrow band blue light to standard light treatment over a period of one week (Meesters and Duijzer, 2011). For specifications of the different light treatments see Table 1.

A total number of 120 patient cases were retrospectively selected based on the following criteria: all subjects met the criteria of Major Depressive Disorder with a seasonal (winter) pattern according to the DSM-IV-TR and did not suffer from other DSM-IV classified psychiatric disorders as assessed by the Mini-International Neuropsychiatric Interview (American Psychiatric Association, 2000; Sheehan et al., 1998). Patients who did not fill out all questionnaires were excluded ($n=12$). The remaining group of 108 subjects consisted of 83 women and 25 men, mean age \pm SD 37.6 ± 12 years.

2.2. Procedures

The Structured Interview Guide for the Hamilton Depression Rating Scale-Seasonal Affective Disorder 24 items version (SIGH-SAD) (Williams et al., 1988) was used to assess severity of depression.

SIGH-SAD ratings were obtained prior to the start of LT, immediately after the last LT day, 1 week after the last LT day and for the two-weeks protocol also halfway the LT period. These studies measured depression score one week after the last LT session as depression score tend to decrease even after the end of treatment. (Meesters, 1995) Proportional improvement scores on the SIGH-SAD were calculated for both conditions.

In all three studies no significant differences between light conditions were observed (see for more details the relevant papers (Gordijn et al., 2012; Meesters and Duijzer, 2011; Meesters et al., 2011)); study 1, main effect “condition” $F(2,49)=0.73$ ns; study 2, main effect “condition” $F(1,20)=0.012$ ns; study 3, 67% recovery for standard treatment and 63% recovery for experimental treatment, ns. For the current analysis we pooled the data of all three studies and all different light conditions.

At baseline, patients filled out a questionnaire about their expectations, consisting of three questions: whether patients believed they would benefit from the therapy, if they thought it was a suitable treatment and whether they would recommend it to a friend with SAD. Answers were given on a 5-point Likert scale. These questions were asked for both the standard treatment and for the experimental treatment (the minimum score was 3 and the maximum score was 15). Significant differences were found between expectations ratings of the different types of treatment (expectation score \pm SD; standard treatment: 10.9 ± 2.2 , experimental treatment: 10.1 ± 2.5 , $p < 0.05$). We decided to use the expectation ratings in accordance to the type of light patients received, as we want to link the therapy expectations to the therapy they received.

2.3. Statistical analysis

Two groups with either one or two weeks of light therapy duration were compared with Chi-square for dichotomous variables ‘group’ and ‘sex’. One-Way ANOVA was used to test for differences in age or baseline depression score between the two groups. SIGH-SAD results were compared with repeated measures ANOVA. Within-subject factor was the depression severity score on timepoints D1, D8 and D15, between-subjects was ‘group’ (1 week or 2 weeks LT) and covariate was the rating they gave concerning their expectations of the treatment. Final depression scores were calculated by the proportional difference between D1 and the last time point (D15 for 1-week LT and D22 for 2-weeks LT). All correlations were analyzed using Spearman (rank) correlation statistics; expectation scores are correlated to percentage depression score reduction.

3. Results

There were no differences in demographics between the two groups (one-week LT and two-weeks LT) (Table 1). Not in sex ratio (f/m 9/33, 16/50, $\chi^2=0.114$ ns), nor in age (mean \pm SD, 37.3 ± 13.1 y; 37.7 ± 11.6 y, $F(1,106)=0.027$ ns), and not in baseline

Table 1
Characteristics of patients, light treatment and results.

	Study		
	Study 1	Study 2	Study 3
Participants	52	14	42
Therapy duration	2 weeks	2 weeks	1 week
Sex n (%)			
Male	13 (25)	3 (21)	9 (21)
Female	39 (75)	11 (79)	33 (79)
Age mean (\pm SD)	37.6 (\pm 11.4)	38.4 (\pm 12.6)	37.3 (\pm 13.1)
Baseline SIGH-SAD score (mean \pm SD)	26 \pm 6	24 \pm 8	25 \pm 5
Proportional reduction SIGH-SAD score (mean \pm \pm SD)	66.3 \pm 34.4	61.2 \pm 28	70.2 \pm 25
Expectation (mean \pm SD)	9.2 \pm 2.1	12.2 \pm 1.1	11.3 \pm 2.7
MEQ (mean \pm SD)	52 \pm 11	52 \pm 8	51 \pm 3
Light specification*			
Standard	5000 °K (10000 lx)	5000 °K (10000 lx)	5000 °K (10000 lx)
Experimental	17000 K (10000 lx)	17000 K (750 lx)	LED Blue light 470 nm (100 lx)
Years of study	2005/2006	2008/2009	2010/2011

* All light conditions except the LED Blue light condition: full spectrum light, without UV.

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