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Can winter depression be prevented by light treatment?

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Summary

The administration of light at the development of the first signs of a winter depression appears to prevent it from developing into a full-blown depression. No patient from a group of 10 treated in this way developed any signs of depression during the rest of the winter season, while five of seven patients from a control group became depressed and needed treatment during the winter season.

Key words: Seasonal affective disorder; Prevention; Depression; Light therapy

Introduction

Seasonal affective disorder (SAD), winter type, is a depressive syndrome characterized by the occurrence of depression each autumn and winter, followed by complete recovery in spring and summer (Rosenthal et al., 1984). Hypersomnia, increased appetite and weight gain are frequent concomitants. The prevalence of SAD is estimated to be 4.3–10% (Kasper et al., 1989). It has been hypothesized that the syndrome is caused by the seasonal fluctuation in light intensity. Various studies have shown that light therapy is a very effective form of treatment for SAD (Terman et al., 1989). Not all patients who suffer from SAD become depressed every winter (Rosenthal et al., 1984). Without prophylaxis or treatment, in one study 67% of the SAD subjects diagnosed in the summer became depressed in the following winter, while 33% did not (Thompson, 1989).

This report concerns an ongoing study, in which we examine whether light treatment can stop the development of a winter depressive episode at a very early stage. For that purpose we compare the course of mood in a group of winter depressives who receive light therapy at the appearance of the first signs of a depression with that in a control group of patients who do not receive therapy.

Methods

All participants met the criteria for winter depression as described by Rosenthal et al. (1984).
From September 1989 until the beginning of April 1990, the subjects' mood was assessed at weekly intervals, by means of self-ratings on the Adjective Mood Scale (AMS) (Von Zerssen, 1986) and the Beck Depression Inventory (BDI) (Beck et al., 1961). The first occurrence of a BDI score $\geq 13$ was considered to represent the first sign of a winter depression. The value of 13 was derived on the basis of the following reasoning. According to Beck et al. (1961) the cut-off between mild depression and no depression is at a BDI score of 17. Taking into account that most SAD people will not score on the sleep, eating and weight items, a score of 13 seems reasonable as a criterion for a very mild (beginning) winter depression. For the same reason a score of 22 is chosen as the cut-off point for severe depression for SAD subjects in this study. It corresponds to the value of 26 taken by Beck et al. as the lower limit value for severe depression. Patients who reached a BDI score $\geq 13$ were randomly assigned to either the treatment or the control group. For each group the numbers of patients who were selected in each month of the winter season are indicated in Fig. 1. During the subsequent period of 24 days, patients in both groups completed the AMS three times a day, and the BDI once a week. After a 4-day baseline period (called ‘before’), light therapy was given during a period of 5 consecutive days, from 9.00 to 12.00 a.m. (this period is called ‘during’). The light came from a set of four full-spectrum fluorescent light tubes (Philips TL 58w/85, 2500 Lux). Mood measurements were continued during withdrawal. This latter period was split into a 10-day period (‘after I’), and a subsequent 5-day period (‘after II’). At the end of the ‘after I’ interval, mood was rated by means of the 21-item Hamilton Rating Scale for Depression (HRSD) (Hamilton, 1967). Interviewers were members of the research team. These four intervals taken together constitute the ‘experimental period’. The subsequent part of the winter season is denoted the ‘follow-up period’. Here mood was assessed weekly (BDI). Patients in the control group who reached a BDI score $\geq 22$ during the experimental period were considered depressed and were therefore offered light treatment. Once they received treatment, these patients could no longer serve as controls in the present study.

Thirty-five patients were monitored from September onward, 10 men, 25 women. Twenty-

![Fig. 1. Cumulative number of subjects who became depressed (BDI $\geq 13$) during the season. B control group, $\square$ subjects of the control group who became severely depressed (BDI $\geq 22$), $\blacksquare$ treatment group. In the treatment group no patient developed signs of depression during the remaining part of the winter season. In this figure, the 2 drop-outs are not included.](image-url)
two came from a group of patients that had taken part in a previous study (Richter et al., 1991), the remaining 13 were recruited through media publicity during the course of the study. All patients had BDI scores below 13 at the beginning of the study.

Nineteen of the original 35 subjects obtained a BDI score ≥13 and were therefore considered to be developing a depression. Their mean age was 39 (±10 SD). Ten of them were given preventive light treatment (two men, eight women), the others constituted the control group (three men, six women) (Fig. 1). The two groups did not differ in severity of depression during the baseline period. Within the experimental period of 24 days three patients from the control group dropped out. One patient became severely depressed (BDI ≥22) and had to be treated with light. Two other patients dropped out because of the unpleasant obligation to perform the frequent mood ratings. Patients visited the clinic for light treatment and HRSD interviews. They filled out self-rating scales at home.

Results

Experimental period

**BDI**

The mean BDI scores of both groups are shown in Table 1 and Fig 2. Unfortunately, one of the 10

### Table 1
THE AVERAGE COURSE OF MOOD DURING THE EXPERIMENTAL PERIOD

<table>
<thead>
<tr>
<th></th>
<th>Treatment group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N   Mean   SD</td>
<td>N   Mean   SD</td>
</tr>
<tr>
<td>AMS Before</td>
<td>10  28.34  11.41</td>
<td>9   21.54  12.31</td>
</tr>
<tr>
<td>During</td>
<td>10  19.21  11.74</td>
<td>9   19.44  8.36</td>
</tr>
<tr>
<td>After I</td>
<td>10  15.31  12.69</td>
<td>9   23.79  11.33</td>
</tr>
<tr>
<td>After II</td>
<td>10  13.58  9.87</td>
<td>6   28.18  9.62</td>
</tr>
<tr>
<td>BDI day 5</td>
<td>10  15.75  6.51</td>
<td>9   12.00  9</td>
</tr>
<tr>
<td>day 12</td>
<td>10  13.56  5.34</td>
<td>8   13.11  7.21</td>
</tr>
<tr>
<td>day 19</td>
<td>10  13.45  6.02</td>
<td>7   15.21  6.22</td>
</tr>
<tr>
<td>day 26</td>
<td>9   5.50   4.05</td>
<td>6   19.75  8.97</td>
</tr>
</tbody>
</table>

Before = days 1–5, during = days 5–9, after I = days 9–19, after II = days 19–24.

patients in the treatment group failed to complete the BDI on day 26.

MANOVA with repeated measures applied to the BDI scores during the control and treatment periods showed a significant interaction effect between time and group ($F(3,39) = 12.069, P = 0.001$). Furthermore, significant improvement was observed in the subjects of the treatment group ($F(3,24) = 9.49, P = 0.00$). The subjects from the control group showed a significant worsening of the scores ($F(3,15) = 4.5, P = 0.02$).

Further analysis of the BDI scores of the treatment group showed that the improvement was immediate (day 12 compared to day 5: $F(1,13) = 8.944, P = 0.010$; day 19 compared to day 5:

Fig. 2. The course of mood (Beck Depression Inventory) in the control group (● — — — ●, n = 9) and the treatment group (● — — — ●, n = 10). Numbers of individuals contributing to the data are indicated. Data are synchronized with respect to the 24-day experimental period. Base = baseline period; exp = experimental period; light = light treatment for the treatment group.
F(1,13) = 9.379, P = 0.009; day 26 compared to
day 5: F(1,13) = 10.243, P = 0.007). In the control
group mood worsened in a more gradual way (day
12 compared to day 5: F(1,13) = 0.801, P = 0.399,
day 19 compared to day 5: F(1,13) = 3.373, P =
0.086; day 26 compared to day 5: F(1,13) = 8.436,
P = 0.012).

**AMS**

The AMS scores showed a development similar
to that of the BDI scores (Table I). It should
be remarked, though, that the mean AMS score
is based on self-ratings which were done three
times daily, while the BDI was only completed
once a week. A significant interaction effect was
noted between time and group (F(3,42) = 14.571,
P = 0.001).

Again a significant improvement of mood was
found in the treatment group (F(3,27) = 13.81,
P = 0.00). Here too, further analysis showed an
immediate effect of treatment (‘during’ versus
‘before’: F(1,14) = 13.585, P = 0.003; ‘after I’ ver-
sus ‘before’: F(1,14) = 18.104, P = 0.001; ‘after
II’ versus ‘before’: F(1,14) = 34.055, P = 0.001).
Similarly, a significant deterioration of mood was
found in the control group (F(3,15) = 7.03, P
= 0.00). Also in the self-ratings the worsening oc-
curred more gradually (‘during’ versus ‘before’:
F(1,14) = 0.139, P = 0.713; ‘after I’ versus ‘be-
fore’: F(1,14) = 0.483, P = 0.505; ‘after II’ versus
‘before’: F(1,14) = 6.871, P = 0.019).

**HRSD**

The mean HRSD score of the treatment group
on day 19 (in week 6) was 7.6 (± 4.3 SD), the
score of the control group was 13.2 (± 4.9 SD).
The difference is significant (Mann–Whitney U:
15.50, z = −2.2, P = 0.03).

**Follow-up period**

During the follow-up period, which lasted until
the beginning of April, four patients of the con-
trol group became severely depressed (BDI > 22)
and therefore received light therapy. In addition,
one control subject obtained a BDI score ≥ 22
during the experimental period. Because of ther-
apeutic intervention the data of these five pa-
tients no longer contributed to the comparison
between the two groups. In contrast, none of the
subjects in the treatment group became severely
depressed. Using a chi-square test this difference
was significant (χ² = 5.4, df = 1, P = 0.02). Three
of the severely depressed patients in the control
group recovered after one series of 5 days of light
treatment, one needed two series and one did not
recover in response to light.

The drop-out is reflected by the decreasing
number of patients contributing to the upper
curve in Fig. 2. In addition, Fig. 2 shows that the
number of patients in the treatment group also
decreased as time progressed (lower curve). This
reduction is not, however, due to a worsening of
mood. Here measurements were stopped because
the end of the experiment was set at the begin-
ning of April. In the treatment group not a single
patient ever exceeded the BDI value of 13. In
addition, none of the four successfully treated
subjects who dropped out from the control group
became depressed again during the same winter
season.

**Discussion**

The administration of light at the very first
sign of a winter depression in this study pre-
vented it from developing into a full-blown de-
pressive episode. The treatment even improved
mood. In contrast, the control group of patients,
who had not been given any therapy, showed a
marked deterioration of mood. This is illustrated
by all mood variables examined. The BDI scores
suggest that the beneficial effects of light treat-
ment were maintained until spring. These find-
ings differ from the commonly reported relapse
period of 3–4 days (Terman et al., 1989) and
show some similarity to the findings of Yereva-
nian et al. (1986), who found almost no relapse
during 14 days following successful photo treat-
ment. In a case study Wirz-Justice et al. (1986)
described a patient who had no relapse up to a
few months after treatment. Lasting remission
was also noted for the four successfully treated
subjects from the control group, who received
light treatment after a BDI score ≥ 22 had been
reached. We do not have an explanation for the
differences between the studies. Perhaps the
weekly contact of the subjects with the research
center (through sending self-rating scales) contributed to the lasting remission.

In interpreting these data, the following point has to be taken into account. The treatment condition not only implied the administration of light, but also a visit to the clinic on 5 consecutive mornings. In contrast, the control patients had to carry on with their normal daily routines. Consequently, the conditions in the two groups differ at least in these two respects. Without proper control for these differences, it remains uncertain which factors are responsible for the beneficial effect of the treatment condition. Nevertheless, even if the visits to the clinic did substantially contribute to the results, they are clinically and theoretically of sufficient interest to warrant further investigation.

References


