Light Therapy for Seasonal Depression in Persons With Intellectual Disability: Literature Review and Four Case Series

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Light therapy has proven to be an efficacious treatment for seasonal and non-seasonal depression in the general population. A literature search identified only two reports discussing the effective use of light therapy for seasonal depression in five persons with intellectual disabilities and seasonal depression. In this article, the effective use of light therapy as an adjunct treatment for major depression with seasonal patterns in four adults with intellectual disability is being reported. No side effects were noted. Light therapy must be further promoted, applied and studied as an effective, benign and inexpensive treatment for seasonal depression in persons with intellectual disability.

Keywords: aggression, intellectual disability, major depression, mental retardation, mood disorder, SIB, seasonal affective disorder, suicide

Seasonal changes in mood have been recorded since Hippocrates’s time in 400 BC but seasonal affective disorder (SAD), which is characterized by hypsomnia, fatigue, increased appetite with carbohydrate craving, weight gain, and social withdrawal, was first fully described by Rosenthal et al. in 1984. Major depression with seasonal pattern as a specifier is described as recurrent major depression in the fall and winter months for two consecutive years, with full remission (or change from depression to hypomania or mania) in the spring or summer. The major depressive episode can be part of major depressive disorder, recurrent type or depressive phase of bipolar disorders. Some individuals experience seasonal depression during the winter months only, during the summer months only (extremes in temperature), or in both seasons.

Light therapy has been found to be efficacious for treatment of seasonal and nonseasonal depression, with effect size equivalent to that in most antidepressant pharmacotherapy trials, according to two recent meta-analyses of randomized, controlled studies in general populations and a recent study. The use of light therapy as an adjunct to antidepressant treatment for nonseasonal depression was supported by a recent randomized well-controlled study but was not supported by the meta-analysis of five studies. A difference in illuminance (Lux 2,500 to 10,000) and short duration of exposure (6 to 28 days) in a total of 67 patients in the five studies might account for the overall negative results in the meta-analysis by Golden et al.

In spite of the reported effectiveness of light therapy, its use as an adjunct or sole treatment, especially for major depression with seasonal pattern in the general population, has been met with limited recognition and support within the psychiatric community. No controlled studies have been performed on the use of light therapy in the treatment of depression with or without seasonal pattern in persons with intellectual disabilities, although the prevalence of mood disorders in persons with intellectual disability is estimated to be similar to or higher than the prevalence in the general population.

In this paper, the literature of light therapy use in persons with intellectual disability was searched and reviewed, and the application of light therapy as an adjunct treatment in four adults with major depression with seasonal pattern is reported.

METHOD

Literature Review

PubMed and PsycINFO from 2000-2006 and Embase from 1993-2006 were searched to identify reports of light therapy use in persons with intellectual disability. The search was conducted using the following prompts: seasonal depression, SAD, major depression with seasonal pattern, mental retardation, developmental and
intellectual disabilities, light therapy and phototherapy.

Case Series

DSM-IV² was the diagnostic instrument used in the four cases, through repeated direct observations and information obtained from the staff and/or parents. Severity of intellectual disability was obtained from previous psychological evaluations in the files of the four patients. More than five characteristics necessary for the diagnosis of major depression in persons with severe/profound intellectual disability are observable signs.³³,³⁴ The staff log and information from the parents and staff were used monthly to establish a global impression by consensus about changes in the individual’s mental status, sleep and eating patterns, and behaviors, following the introduction of light therapy.

RESULTS

Literature Search and Review

There have been only two reports of light therapy as treatment for seasonal and nonseasonal depression and two reports of the use of light therapy for sleep disturbance in patients with intellectual disability. Cooke and Thompson⁷ reported adequate clinical response to light therapy in two patients with intellectual disability and seasonal cycles in mood-related behaviors. One patient was a 44-year-old male with a moderate degree of intellectual disability, and the other, a 9-year-old boy with a severe degree of intellectual disability and seizures. Both patients were diagnosed with autism spectrum disorder. The report suggested further studies on light therapy as treatment for mood disorders with seasonal pattern in persons with intellectual disability and proposed that behavioral abnormalities may aid in the diagnosis of SAD in persons with intellectual disability and poor verbal skills.

Altabet et al.¹ reported the effectiveness of light therapy (10,000 LUX x 30 minutes x 12 weeks) as treatment for sleep cycle disturbances and/or nonseasonal depression in three older patients (two females, ages 42 and 61 years, and one 68-year-old male) with profound intellectual disability. In addition to their different medical problems, the two females experienced seizures, under control with anticonvulsants, and the 42-year-old female was treated with olanzapine and fluoxetine for her depression.

The use of light therapy was also suggested for resetting the circadian rhythms in those with severe/profound intellectual disability.⁶ It has been found helpful in improving sleep pattern in a person with profound intellectual disability secondary to congenital hydrocephalus,²⁷ and in 7 of 12 children, nine months to four years of age, with moderate to severe intellectual disability secondary to different brain syndromes. Lindblom et al.¹⁹ found evidence of sleep pattern disturbances during winter sleep in people with intellectual disability, and light therapy was suggested as a treatment during the winter months.

Case Series

Light therapy (5,000 LUX one-half hour every morning) was initiated, as an adjunct treatment, in four adults with intellectual disability and major depression with seasonal pattern. A sun box of 5,000 LUX instead of 10,000 LUX was chosen since it was unclear whether the individuals with intellectual disability would be able to tolerate 10,000 LUX. Patients included three females with severe intellectual disability and one male with mild intellectual disability in the age range of 44-51 (mean age 46). They all lived in the various boroughs throughout the New York metropolitan area.

CASE #1

Mr. A was a verbal, 45-year-old male with mild intellectual disability secondary to Down syndrome and seizure disorder, obsessive compulsive disorder, and major depression, recurrent with seasonal pattern. He lived with his parents and attended a workshop program. He had been treated with phenytoin for his epilepsy (other anticonvulsants could not control his seizures), and sertraline 150mg daily plus risperidone 1mg daily for his major depression and obsessive compulsive behavior.

During the spring and summer months, he was active, friendly, talkative with mildly euphoric mood, and without any evidence of suicidal ideation. For two consecutive years, Mr. A suddenly became depressed during the first two weeks of October without changes in any of his medications or any other medical illness or environmental stressors and was hospitalized. Sertraline was replaced with fluvoxamine 300mg daily during his second psychiatric hospitalization (October 2002) following a suicide attempt (he
jumped from the roof of a two-story building, without sustaining any injury).

Because of the seasonal pattern of his depressive disorder, light therapy was suggested in September 2003. However, this was not initiated and by the second week of October 2003, Mr. A was seen and presented with the symptoms of major depression again. According to his parents, during the two weeks before the visit, Mr. A lost interest in things he loved to do, appeared tired, did not take good care of his personal hygiene and his appetite and sleep were disturbed. His presentation and mental status were exactly as they were the previous October. Facial expression and mood were depressed, affect was constricted, signs of psychomotor retardation were evident, and his speech was sparse. He denied any symptoms of a psychotic process. He said, “What’s the use of being alive? It is better dead.”; however, he denied any intention of killing himself or having a plan. In order to prevent another suicide attempt, his parents were instructed to bring him to the nearest emergency room for hospitalization.

Mr. A was brought in for a follow-up visit in February of the following year (2004). He had not been hospitalized. However, two days after their last visit in October 2003, his parents purchased the sun box (5,000 LUX) and began treating Mr. A with light therapy for one-half hour every morning. According to his parents, in one week’s time, all of Mr. A’s depressive symptoms were reversed and he stopped expressing his wish to die. During cloudy and very cold days of the winter months, Mr. A stayed in bed, at times for one to two days, but overall, he was “himself,” according to his parents. A mental status examination in February 2004 confirmed this. Light therapy treatment, which began on September 20 and continued daily during the fall and winter months of 2004–2005 and 2005–2006, prevented the recurrence of another depressive episode, while the maintenance dose of fluvoxamine was reduced to 200mg daily.

Case #2

Ms. A was a 51-year-old, single female, non-verbal, with severe intellectual disability of unknown etiology, seizure disorder, personality changes due to traumatic brain injury, mixed type, and major depression, recurrent with seasonal pattern. Ms. A had had a right-sided craniotomy and lobectomy during childhood for control of severe aggressive behaviors. Ms. A was a resident of the intermediate care facility of a non-profit agency, living in the community and attending a day treatment program. During depressive episodes, Ms. A became regressed, disorganized, very agitated, and engaged in severe self-injurious behavior (SIB), banging her head against walls or other objects and scratching her face.

Through the years, her seizures had been well-controlled with the use of carbamazepine and various psychotropics had been prescribed to control her SIB. When the diagnosis of major depression, recurrent, was established, different antidepressants were tried, but Ms. A could not tolerate the tricyclic antidepressants (constipation and increased agitation) and the selective serotonin reuptake inhibitors (SSRIs) or the serotonin and norepinephrine reuptake inhibitors (SNRIs) (stopped eating and started oversleeping). A combination of trazodone 300mg, olanzapine 7.5mg h.s., pindolol 7.5mg b.i.d. and melatonin 3mg h.s. helped keep Ms. A in a euthymic mood and free of challenging behaviors.

In the past three years, signs of depression were observed during the fall and winter months (irritability, agitation, fatigue, depressed mood, sleep disturbance, loss of interest, lack of energy and increased SIB). Reports from her day treatment program revealed noncompliance, irritability, agitation, and increased incidence of aggression and SIB. Light therapy treatment for Ms. A during the fall and winter months was suggested during 2003 and 2004; however, the sun box (5,000 LUX) was not purchased until March 15, 2005 at which time it was used for one-half hour every morning. No changes were made to her psychotropic regimen. One week after the initiation of the light therapy treatments, the depressive symptoms were reversed, and her challenging behaviors were eliminated. Light therapy was restarted during the last week of September 2005 and prevented a relapse of her depressive episode during the winter of 2005–2006.

Case #3

Ms. B was a 45-year-old female with severe intellectual disability with autistic disorder, Tourette’s disorder and bipolar II disorder. She was a resident of an intermediate care facility of a non-profit agency, living in the community and attending a day treatment program. Various
psychotropics were tried in the past for her SIB, as well as her screaming and spitting behaviors. She was very sensitive to clonidine, haloperidol, risperdone, SSRIIs and beta blockers. Although her motor and vocal tics were not fully controlled, her mood was stabilized with a combination of carbamazepine 800mg, olanzapine 7.5mg and citalopram 20mg daily, except during the winter months when a severe decline was observed in her ADL, communication and cognitive skills and an increase in her screaming, spitting and SIB. Improvement in her overall condition during the spring and summer months and a relapse, but to a minor degree, during the winter months of 2004 and October 2005, confirmed the seasonal pattern of her depression.

Light therapy was ordered and implemented (sun box of 5,000 LUX for one-half hour every morning) during the month of October 2005 when she had developed signs/symptoms of depression with atypical features and her challenging behaviors had increased again. Reversal of all the signs/symptoms of depression (low energy, lack of interest in activities she previously enjoyed, reduced communication, crying spells, increased appetite, depressed mood, irritability, psychomotor agitation) and a dramatic decrease in her screaming, spitting and SIB were observed. These observations were documented by the staff of the intermediate care facility and the treating psychiatrist ten days after her exposure to light therapy. Light therapy continued up to April 15, 2006 without a relapse in her condition and without any changes in the combination of psychotropics she received during the winter months.

**Case #4**

Ms. C was a 44-year-old single female diagnosed with severe intellectual disability, autistic disorder, seizure disorder, hypothyroidism, spastic diplegia, impulse control disorder, not otherwise specified and bipolar II disorder, rapid cycling (more than four depressive episodes per year) with seasonal pattern. She was seen for consultation because of the catatonic-like state (mutism, immobility, refusal to eat or cooperate with her care) she entered when in a depressed phase and the severe SIB she engaged in when depressed (hanging her head against objects or hitting it with her fist). When not depressed, she was full of energy with mildly euphoric affect, overtalkative, wearing colorful clothing and spending time coloring books. Unfortunately, the “good periods” were very short, few and far between the depressive periods.

Medication changes reduced the severity and the duration of depressive episodes, but it was observed that most of her depressive episodes were documented during fall and winter as well as summer months. Light therapy treatment (sun box 5,000 LUX one-half hour daily, morning exposure) was begun during 2003-2004, from September 15 to April 15, while the medication regime remained constant. She has been on Synthroid 125mcg for hypothyroidism; long-acting carbamazepine 1200mg daily for her seizures; long-acting lithium 900mg daily; sertraline 200mg daily; desipramine 100mg daily; lorazepam 1.5mg daily, and melatonin 6mg h.s.

Ms. C was a resident of a developmental center because of the high level of care she required. According to her parents, who visited her regularly, the direct staff and the data compiled by her behaviorist/psychologist, the number of days that she was in a depressed state during the fall and winter months decreased by 60% after light therapy was initiated during the 2003–2004 fall and winter months. She relapsed into a depressive episode in December 2004 because light therapy was not implemented (light bulb was broken). The depressive episode was reversed after light therapy was resumed in January 2005. Light therapy restarted on September 2005 to April 2006 with similar positive results as in the previous year.

**DISCUSSION**

In the cases reviewed and presented, light therapy as an adjunct treatment was efficacious in reversing or preventing depressive episodes during the fall and winter months in four individuals with intellectual disability in whom a seasonal pattern of major depressive disorder was diagnosed. The seasonal depression in these cases was resistant to treatment with antidepressants, mood stabilizers, and atypical antipsychotics.

The side effects of light therapy are limited and include low frequency of eye strain, headaches, nausea, and agitation, or “switching to hypomania,” which is a phenomenon observed with use of most of the antidepressants prescribed for bipolar depression without co-administration of mood stabilizers. No side effects were reported or observed in these four cases. In the four cases reported, 5,000 LUX for
one-half hour morning exposure proved efficacious and was well-tolerated by the individuals.

Why has this inexpensive and efficacious treatment not been applied to more people with intellectual disability and seasonal depression? One possible reason is that there have been no epidemiological or other studies dealing with the prevalence of seasonal depression in persons with intellectual disability. The recognition and diagnosis of mood disorders in people with intellectual disability has advanced in the last 15 years, and recognition of signs, symptoms, and behaviors suggesting seasonal pattern must be the focus of future studies, as suggested by Cooke and Thompson. Can light therapy be recommended as treatment for seasonal and nonseasonal depression in persons with intellectual disability? The use of phototherapy was not recommended in a recent review of other biological treatments for mood disorders in persons with intellectual disability, as "there is little evidence for the effectiveness of phototherapy with people with intellectual disability and mood disorders at this time." However, if this argument against phototherapy is correct, then all the psychotropics must not be recommended for use in people with intellectual disability either, since there hasn't been any well-randomized and controlled study done with any of the psychotropic medications in this population.

Another reason for the under-utilization of light therapy is because the physiological mechanism by which light therapy works is, as yet, unknown. However, we still use the mood stabilizers and antipsychotic drugs without questioning much about their mechanism of action as long as they have been proven effective. It is possible that the direct mechanism by which light therapy works will be identified in the future, as well as the mechanism of action of the various psychotropics.

A recent study suggests that light therapy through the suprachiasmatic nucleus promotes the secretion of glucocorticoid from the adrenal glands and the activation of the organism as a whole. Another study found that enforced darkness for 14 hours per day significantly decreased the mania rating and the days of hospitalization in 16 hospitalized manic patients, which is exactly the opposite of the response to bright light treatment in individuals with depression. Metabolic depression is a well-coordinated process of different systems and pathways associated with transcription factors and differential gene expression. Initiated in response to stressors for energy preservation (conservation/savings) and survival of the organism, it is observed in organisms ranging from worms and inula lactea to bears. It has been proposed and further elaborated that a form of metabolic depression is responsible for the lack of energy, fatigue, lack of interest in the environment, and sleep and eating disturbances associated with major depression. The way humans cognitively perceive, understand, communicate and react to the above vegetative signs and main characteristics of depression contributes the additional characteristics of depression, including feelings of worthlessness: guilt; inability to concentrate; and suicidal ideations, threats, or attempts. If metabolic depression is the underlying process responsible for major depression, as it is for hibernation, then light therapy prevents or reverses the well-coordinated adaptive process of metabolic depression, which is initiated by reduced daily sunlight or extremes in temperature (both signs of food shortage and danger to the survival of the hibernating organism).

Finally, one more reason that light therapy is underutilized is that no individual or entity has the patent for light therapy treatment in order to finance studies, or promote and advertise it as a treatment for depression.

**Treatment Recommendations**

Light therapy treatment should be initiated daily or four days/week from September 15th to April 15th (each fall and winter season) using a sun box of at least 5,000 LUX for one-half or 1 hour exposure or 10,000 LUX for one-half hour exposure. Evidence for the superiority of morning use of light therapy vs. evening use was established in a large number of patients, although evening use has been suggested for about 25% of individuals who exhibit tiredness and sleepiness around sunset. Consideration must be given to persons taking medication, which may produce photosensitivity, and to persons diagnosed with bipolar disorder who are not on a mood stabilizer. Mood stabilizers must be prescribed, and the light therapy treatment must be reduced in frequency or terminated if a state of hypomania or mania emerges. Recent studies have suggested that narrow bandwidth blue light...
outperformed dimmer red light in reversing symptoms of major depression with a seasonal pattern.\textsuperscript{11} Although narrow bandwidth blue light was tolerated better than bright light, its efficacy in comparison to broad spectrum white light has to be determined through future studies.

Different companies produce and sell different types of sun boxes for light therapy. These companies can easily be found through the internet by using light therapy or winter depression as a prompt.

The signs and symptoms that suggest SAD, winter depression or major depression with seasonal pattern have been described in the introduction of this article.\textsuperscript{2,23} Light therapy can be considered in persons with intellectual and developmental disabilities when the following have been observed during the fall and winter months: psychiatric signs and symptoms; changes in eating and sleeping patterns, mood changes and crying spells; increased signs of anxiety, signs of panic attacks and exacerbation or reemergence of old fears, phobias and rituals; decreased energy and interest in previously enjoyed activities, increased irritability, agitation and pacing or psychomotor retardation (moving very slowly), reaching immobile or catatonic-like state, reduced concentration and drop in school or workshop performance; increased mentioning of deceased loved ones, and at times, wishing to be dead and reemergence of incontinence in persons who had been successfully toilet trained. The aforementioned changes are observable characteristics of depression even in persons with severe and profound intellectual disability.\textsuperscript{33,34}

Some of the behavioral changes that are triggered or exacerbated by the underlying depressive state, which are often observed and reported first by parents and staff of individuals with intellectual disability are: challenging behaviors: increased non-compliance and overall resistance in attending school or various programs in the morning or special activities in the afternoon or evening; increased clinging behavior toward parents or staff, refusal to separate from them and avoidance of closed, crowded or noisy places; increased craving for caffeine or nicotine in individuals who are coffee drinkers or cigarette smokers; exacerbation or reemergence of destructive and aggressive behavior toward others, but more often toward self in the form of SIB; increased somatic complaints, frequent contacts with the nurse and increased requests to see a doctor; reduced interaction, socialization and communication with parents, staff or friends; drop in adaptive daily living skills, personal hygiene and choosing clothing. All of these behaviors have been associated with major depression in individuals with intellectual disability and not only with seasonal depression.

There is a need to conduct studies that would evaluate whether there is any difference in the signs/symptoms between seasonal and non-seasonal depression in individuals with intellectual disability and to delineate which of the behavioral changes are associated with seasonal depression. Such studies would permit a better recognition of individuals with seasonal depression and then, controlled studies of light therapy versus placebo (dim light) can be undertaken. These studies will be patterned on similar studies conducted in the general population, but not to prove the efficacy of light therapy as an adjunct or only treatment for seasonal and non-seasonal depression, since its efficacy has already been established.\textsuperscript{12,17,20,32}

Such requirements of efficacy have not been discussed in the literature of intellectual and developmental disabilities regarding treatments with all available psychotropics. The studies need to be conducted for a better characterization of the signs, symptoms and behaviors associated with seasonal depression in persons with intellectual disability and a better delineation of the variables associated with the best responders to treatment with light therapy. Such variables include family history, etiology of intellectual disability, developmental history, temperament and personality, type of depression or mood disorder, other psychiatric diagnosis including autism and dementia, and concurrent medication.

CONCLUSION

Light therapy has proven effective as treatment for seasonal and nonseasonal depression and as an adjunct to antidepressant treatment for nonseasonal depression in the general population, as well as in a few cases where it was tried and reported in people with intellectual disability, including the aforementioned four cases. It is an inexpensive treatment with a benign side effects profile. There is a need for more case reports, studies focusing on the signs, symptoms and behaviors associated with the seasonal patterns in major depression.
and controlled studies of light therapy for major depression in persons with intellectual disability focusing on variables associated with good response. Meanwhile, application of light therapy treatment in people with intellectual disability who have been diagnosed with seasonal or nonseasonal depression is strongly recommended.

REFERENCES


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