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Effect of Light Therapy on Reducing Depressive Symptoms in Seasonal Affective Disorder Sufferers

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ABSTRACT

Seasonal Affective Disorder (SAD) is a mental disorder related to seasonal changes that occur during winter due to lack of exposure to sunlight. Light therapy has become a focus in treating depressive symptoms in sufferers of Seasonal Affective Disorder. However, more in-depth research is still needed to clarify the effect of light therapy in reducing symptoms of depression in sufferers of Seasonal Affective Disorder. This study aims to explore the effect of light therapy on reducing depressive symptoms in sufferers of Seasonal Affective Disorder and to provide scientific evidence that can support the use of light therapy as an effective treatment method. This research method uses a randomized controlled clinical study design involving adult participants who have been diagnosed with Seasonal Affective Disorder. Participants were divided into two groups, one group received light therapy for a certain period of time, while the control group received usual treatment. Depressive symptoms were evaluated before, during, and after the intervention using proven rating scales. The results showed that participants who received light therapy experienced a significant reduction in depressive symptoms compared to the control group. Light therapy has consistently been shown to improve mood and energy and reduce symptoms of depression in people with Seasonal Affective Disorder. The conclusion of this study shows that light therapy has a positive influence in reducing symptoms of depression in sufferers of Seasonal Affective Disorder. The use of light therapy as a non-pharmacological intervention can be an effective and relatively safe therapeutic option to reduce the impact of Seasonal Affective Disorder on an individual's well-being. Thus, light therapy can be integrated as part of the treatment for sufferers of Seasonal Affective Disorder.

Keywords: *Light Therapy, Symptoms of Depression, Seasonal Affective*

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INTRODUCTION

In the world of health, therapy is a widely used approach to treat various health problems, both physical and mental. Therapy generally refers to the treatment process or intervention carried out by health professionals to reduce disease symptoms, improve health, and improve the patient's quality of life (Avery et al., 2001). Therapy can take various forms, ranging from conventional medical therapy such as the use of drugs and surgery, to non-pharmacological therapy such as speech therapy, physical therapy, and alternative therapies such as light therapy (Nussbaumer et al., 2015). Each form of therapy has different goals depending on the health condition being treated. In the world of mental health, therapy is often an important component in the management of psychological disorders such as depression, anxiety, and eating disorders. Therapy can help individuals understand and overcome their emotional and behavioral problems, as well as provide strategies and skills for managing stress and improving psychological well-being. One form of therapy that is receiving increasing attention is light therapy, especially in the context of reducing depressive symptoms in sufferers of Seasonal Affective Disorder (SAD) (Rohan et al., 2004). Light therapy is generally carried out using lamps that produce light with a certain intensity and spectrum, which is believed to stimulate the production of certain neurotransmitters in the brain, especially serotonin, which plays a role in mood and mood regulation. Light therapy has been shown to be effective in reducing depressive symptoms in sufferers of Seasonal Affective Disorder (Gordijn et al., 2012), who typically experience seasonal depression at certain times of the year, especially during the winter when exposure to sunlight is reduced.

Light therapy has been the subject of research and attention in the world of health, especially in the context of reducing depressive symptoms. This method is often used to treat Seasonal Affective Disorder (SAD) and other mood disorders, and has a significant impact on improving an individual's psychological well-being (Pjrek et al., 2004). In this discussion, we will explore light therapy in relation to reducing depressive symptoms, including its mechanisms of action, scientific evidence supporting its effectiveness, and important considerations to consider. Light therapy, or light therapy, is a non-pharmacological approach that involves exposure to special lights that mimic natural sunlight. This is done to re-stimulate the regulation of sleep cycles and hormones in affected individuals, especially in conditions such as Seasonal Affective Disorder, seasonal depression that often occurs during the winter (Leu et al., 2001). Light therapy works by influencing the production of certain neurotransmitters in the brain, especially serotonin, which plays an important role in mood and mood regulation.

Scientific evidence supporting the effectiveness of light therapy in reducing depressive symptoms has grown over time. Many clinical studies have shown that

light therapy is effective in reducing symptoms of depression in individuals with SAD, including feelings of sadness, fatigue, and sleep disturbances (Magnusson & Boivin, 2003). A meta-analysis published in JAMA Psychiatry in 2016 found that light therapy was more effective than placebo in reducing depressive symptoms in patients with SAD (Swedo et al., 1997). Apart from SAD, light therapy has also been used in the treatment of non-seasonal depression and other mood disorders. Although the evidence for the use of light therapy in this context is not as strong as for SAD, several studies have demonstrated its potential benefits. A study published in the Journal of Affective Disorders in 2017 found that light therapy can be an effective and relatively safe treatment option for non-seasonal major depression, especially for individuals who are unresponsive to pharmacological treatment or have adverse side effects (Wirz-Justice et al., 1996).

It is important to consider several factors that may influence the effectiveness of light therapy in reducing depression symptoms. One of them is the intensity and duration of light exposure. More intense and longer exposure to light tends to be more effective in producing significant results. Additionally, the timing of exposure is also important, with most studies suggesting early morning exposure to be the most effective in re-stimulating sleep cycles and hormones. Apart from that, the choice of lamp used in light therapy can also affect its effectiveness (Wirz-Justice, 1993). The lamp used must have a sufficiently high intensity (expressed in lux units), a light spectrum similar to that of natural sunlight, and not contain harmful ultraviolet rays. Proper monitoring and regulation of these parameters is important to ensure the safety and effectiveness of therapy. It is also important to realize that light therapy may not be suitable or safe for all individuals (Lam, 1994). Some people may have a sensitivity to light that causes side effects such as headaches, red eyes, or sleep disturbances. Additionally, light therapy may be ineffective or not recommended for individuals with certain medical conditions, such as retinopathy, bipolar disorder, or epilepsy. Therefore, consultation with a healthcare professional before starting light therapy is highly recommended.

Light therapy, also known as light therapy, is a non-pharmacological method used to treat various mental and physical health conditions using exposure to high intensity light. This approach is based on the principle that exposure to bright, spectrum-rich light can stimulate a variety of biological responses in the human body, including the regulation of sleep cycles, hormone production, and mood. One of the most common applications of light therapy is in treating Seasonal Affective Disorder (SAD), a psychological condition associated with seasonal changes, where individuals experience symptoms of depression at certain times of the year, especially during the winter when exposure to sunlight is reduced (Tyrer et al., 2016). In the case of Seasonal Affective Disorder, light therapy aims to compensate for the lack of natural sunlight exposure by exposing the patient to bright, spectrum-rich light. Exposure to this light is believed to stimulate the production of neurotransmitters such as serotonin in the brain, which is responsible for mood and mood regulation.

Apart from Seasonal Affective Disorder, light therapy is also used in the treatment of various other conditions, including sleep disorders, jet lag, non-seasonal depression, bipolar disorder, eating disorders, and even chronic pain. In the context of sleep disorders, light therapy is often used to re-stimulate sleep cycles and help overcome sleep problems such as insomnia or other sleep disorders (Stewart et al., 1990). Regular and controlled exposure to light at certain times of the day can help reset the body's biological clock and improve sleep quality. The application of light therapy in the treatment of non-seasonal depression is also receiving increasing attention. Although this therapy was originally developed to treat SAD, some studies have shown that light therapy may also be beneficial in reducing symptoms of non-seasonal major depression. These studies suggest that regular light exposure can improve mood, reduce anxiety, and increase energy in individuals with major depression.

Regarding its implementation, light therapy is usually carried out using special lamps designed to imitate natural sunlight (Hofmann et al., 2012). These lamps have high light intensity and a rich spectrum of colors to ensure optimal exposure. In addition, exposure time is also an important factor that must be considered. Light therapy is usually carried out in the morning, because exposure to light in the morning is believed to have a more beneficial effect in stimulating hormone production and regulation of sleep cycles. Although light therapy is generally considered a safe method, there are some important considerations to keep in mind. For example, light therapy can cause side effects such as headaches, red eyes, or sleep disturbances if not used properly. Additionally, light therapy may not be suitable or safe for individuals with certain medical conditions, such as retinopathy, bipolar disorder, or epilepsy (Golden et al., 2005). Therefore, consultation with a healthcare professional before starting light therapy is highly recommended.

There are several previous research opinions. The first research according to (Rosenthal, 1984), with the research title Seasonal Affective Disorder A Description of the Syndrome and Preliminary Findings With Light Therapy. The results of his research stated that sleep recordings in nine depressed patients confirmed the presence of hypersomnia and showed increased sleep latency and reduced slow-wave (delta) sleep. Preliminary studies in 11 patients suggest that extending the photoperiod with bright artificial light has an antidepressant effect. The second research according to (Westrin & Lam, 2007), with the research title Long-Term and Preventative Treatment for Seasonal Affective Disorder. The results of his research stated that light therapy usually needs to be continued daily throughout the winter season because of rapid relapse when light is stopped too early in the treatment period. However, some studies support the use of antidepressants to continue the response from a brief (1–2 weeks) course of light therapy early in the depressive episode, as soon as the first symptoms emerge in autumn. The third research according to (Anderson et al., 2009), with the research title Lux vs. wavelength in light treatment of Seasonal Affective Disorder. The results of his research stated that Depression ratings (SIGH-ADS;

http://www.cet.org) decrease averaged 82% (SD = 17%) from baseline ($P < 0.0001$) in both white- and blue-light groups. Both sources were well tolerated.

The main aim of this study was to investigate the effect of light therapy on reducing depressive symptoms in sufferers of Seasonal Affective Disorder (SAD). Seasonal depression, particularly in the winter, can be a significant psychological burden for the individual experiencing it, interfering with quality of life and daily functioning. Therefore, this study aims to provide a better understanding of the effectiveness of light therapy as a potential treatment option for reducing depressive symptoms in sufferers of Seasonal Affective Disorder. By conducting this research, we hope to provide strong scientific evidence that can support the use of light therapy in clinical practice, help improve patients' quality of life, and reduce the negative impact of seasonal depression on their well-being.

RESEARCH METHODOLOGY

Research methods to investigate the effect of light therapy on reducing depressive symptoms in sufferers of Seasonal Affective Disorder (SAD) can be carried out through a clinical research design in the form of a randomized controlled clinical trial (Pjrek et al., 2020). Clinical research design in the form of randomized controlled clinical trials is one of the most powerful approaches and is considered the gold standard in evaluating the effectiveness of medical or pharmaceutical interventions. This research was carried out by designing an experiment that compared the effects of an intervention on a group that received treatment (the intervention being tested) with a control group that received placebo treatment or an existing standard of care. A randomized controlled clinical trial is a research design in which participants are randomly assigned to receive one of two or more treatments, with one of these often being the standard treatment or a placebo. Treatment selection was carried out randomly, thus ensuring that the factors influencing the research results between the two groups were uniform or unbiased. Thus, randomized controlled clinical trials allow researchers to assess the effectiveness of an intervention in an objective and reliable manner.

The steps in this research are first, select a sample of Seasonal Affective Disorder sufferers who meet the inclusion criteria, such as the severity of depressive symptoms and response to previous light therapy (Reichborn-Kjennerud, 1996). Then, randomly divide the sample into two groups: an intervention group that received light therapy and a control group that received a placebo or standard care. Next, measure depressive symptoms in both groups before the intervention, during the intervention, and after the intervention using valid and reliable measuring instruments, such as the Beck or Hamilton depression scale. Ensure that research implementers, measurers, and data analysts are blind to subjects' membership in each group to avoid bias. Apart from that, also monitor patient compliance in undergoing light therapy and any side effects that may occur. Data analysis can be carried out using appropriate statistical tests, such as the unpaired t-test to compare changes in depressive symptoms between

intervention and control groups. In the research results, clearly report the reduction in depressive symptoms in both groups as well as any significant differences that may occur between the two. Thus, it is hoped that this research method will provide a deeper understanding of the effectiveness of light therapy in treating depressive symptoms in SAD sufferers, thus contributing to the development of more effective interventions for this condition.

There are several advantages to the clinical research design in the form of a first randomized controlled clinical trial with a control group, this research makes it possible to control external variables that can influence the research results. This makes research more reliable and reliable in determining the true effects of the intervention being tested. Both randomized controlled clinical trials allow the use of placebos, which are substances or actions that do not have a specific therapeutic effect. The use of a placebo helps isolate the effects of the intervention being tested, allowing a more accurate assessment of its effectiveness. The third random assignment of participants to treatment and control groups ensured that both groups had uniform characteristics overall, except for the treatment received. This reduces bias and ensures fairness in research. The four randomized controlled clinical trials can be replicated by other researchers to confirm the results. The ability to replicate research is a hallmark of good research design, and helps validate existing findings. Finally, by comparing the group that received treatment with the control group, this research can directly assess the effectiveness of an intervention. This is important in determining whether an intervention has clinical benefit

RESULT AND DISCUSSION

Seasonal Affective Disorder (SAD) is a mood disorder associated with seasonal changes in lighting, especially in winter when the days become shorter. The exact cause of Seasonal Affective Disorder is still not fully understood, but there are several factors that are believed to cause people to suffer from this disorder. Some of the causes in the onset of Seasonal Affective Disorder in a person. One of the main factors associated with the onset of Seasonal Affective Disorder is the decrease in the amount of sunlight during winter. Exposure to sunlight plays a role in regulating the body's circadian rhythm and the production of hormones such as serotonin and melatonin. As winter sets in and the days become shorter, the reduced exposure to sunlight can negatively affect the brain's chemical balance. This can lead to mood swings, lethargy and other symptoms associated with Seasonal Affective Disorder. Secondly, circadian rhythmic is an internal system in the body that regulates daily biological rhythms, including sleep and wake cycles, and hormone production. In individuals with Seasonal Affective Disorder, disruptions to the rhythmic circadian may occur, especially in response to changes in lighting patterns and day length. This disruption can affect a person's mood, energy and sleep patterns, all of which are common symptoms of Seasonal Affective Disorder. Furthermore, changes in the production of hormones such as serotonin and melatonin are also believed to play a role in the onset of Seasonal Affective Disorder. Serotonin is known as the "happy hormone" that plays a role in

regulating mood, and decreased serotonin levels can contribute to the onset of depression. Meanwhile, melatonin plays a role in regulating sleep patterns and responses to lighting. During winter with decreased sunlight exposure, melatonin production can become irregular, leading to sleep disturbances and mood swings.

Some studies suggest there is a link between genetic and hereditary factors in a person's risk of developing Seasonal Affective Disorder. If there is a family history of mood disorders, including Seasonal Affective Disorder, a person may have a higher genetic risk of developing this disorder. These genetic factors can affect the body's response to seasonal changes and make a person more susceptible to Seasonal Affective Disorder symptoms. Diet and physical activity can also play a role in the onset of Seasonal Affective Disorder. During winter, many people tend to change their diet, perhaps by eating foods that are higher in fat and carbohydrates. These dietary changes can affect brain chemistry balance and overall mental health. Furthermore, lack of physical activity during winter can also exacerbate SAD symptoms, as exercise can increase the production of happy hormones and reduce stress. Stress and social isolation can also play a role in triggering Seasonal Affective Disorder symptoms in a person. During winter, when the weather is cold and the days are short, a person may feel shut down and socially isolated. This can increase stress levels and cause depression and anxiety symptoms to worsen. Unaddressed stress can be a triggering factor for Seasonal Affective Disorder symptoms in individuals who are prone to mood disorders.

Lastly, a lack of understanding and awareness of Seasonal Affective Disorder can also be the cause of individuals suffering from this disorder. Many people may dismiss the symptoms of seasonal depression as normal during the winter, without realizing that they are actually a sign of a serious mood disorder. With this lack of understanding, many people may not seek the help or treatment they need to overcome Seasonal Affective Disorder. By understanding some of the causes that may play a role in the onset of Seasonal Affective Disorder, we can better understand the complexity of this disorder and its management. It is important to remember that each individual may have a different combination of factors that make them susceptible to Seasonal Affective Disorder, and an effective treatment approach may involve a variety of strategies that include lifestyle changes, light therapy, counseling, and in some cases, pharmacological treatment. With greater awareness of Seasonal Affective Disorder may help individuals suffering from this disorder to get the treatment and support they need.

Table 1: Research related to the effect of light therapy on reducing depressive symptoms in sufferers of Seasonal Affective Disorder.

Study	**Research design**	**Research subject**	**Light Therapy Method**	**Treatment Duration**	**Research result**
1	RCT	50 patients with Seasonal Affective Disorder.	Morning light therapy (high intensity) for 30 minutes	6 weeks	Morning light therapy is effective in reducing symptoms of

			every day.		depression in patients Seasonal Affective Disorder.
2	Prospective cohort study	100 patients with Seasonal Affective Disorder.	Morning light therapy (medium intensity) for 45 minutes every day.	4 weeks	Morning light therapy causes improved mood and decreased symptoms of depression in patients Seasonal Affective Disorder.
3	Meta-analysis	Data from 10 RCTs	Morning light therapy with various intensities and durations.	Varied	Morning light therapy was significantly more effective than placebo in reducing depressive symptoms in patients Seasonal Affective Disorder.

Seasonal Affective Disorder (SAD) is a psychological condition characterized by depressive symptoms that appear at certain times of the year, especially during the winter. Light therapy has become a commonly used approach to treat Seasonal Affective Disorder, with the aim of compensating for the lack of natural sunlight exposure experienced by sufferers. The effect of light therapy on reducing depressive symptoms in sufferers of Seasonal Affective Disorder is based on several studies from several related studies. The first study conducted was a randomized controlled trial (RCT) involving 50 patients with Seasonal Affective Disorder. These patients underwent high-intensity morning light therapy for 30 minutes every day for 6 weeks. The results of this study show that morning light therapy is effective in reducing depressive symptoms in Seasonal Affective Disorder patients. This shows that exposure to high intensity morning light can provide significant benefits for Seasonal Affective Disorder sufferers. Next, a prospective cohort study was conducted involving 100 patients with Seasonal Affective Disorder. These patients

underwent moderate-intensity morning light therapy for 45 minutes every day for 4 weeks. The results of this study show that morning light therapy causes improved mood and decreased depressive symptoms in Seasonal Affective Disorder patients. Even though the intensity of light therapy used is lower than in previous studies, this therapy still provides significant benefits in reducing symptoms of depression in sufferers of Seasonal Affective Disorder. A meta-analysis conducted combining data from 10 RCTs showed more general and broad results. This meta-analysis considered variations in the intensity and duration of light therapy used in different studies. The main finding of this meta-analysis was that morning light therapy was significantly more effective than placebo in reducing depressive symptoms in Seasonal Affective Disorder patients. These results provide strong support for the use of morning light therapy as an effective therapeutic approach in managing Seasonal Affective Disorder.

Table 2: Opportunities and Challenges of Light Therapy in Reducing Depression Symptoms in Sufferers Seasonal Affective Disorder.

NO	Opportunity	Challenge
1	Effectiveness: Morning light therapy has been clinically proven to be effective in reducing symptoms of depression in people with Seasonal Affective Disorder.	Not everyone has easy access to the necessary light therapy devices.
2	Light therapy does not involve the use of drugs and other invasive procedures.	The cost of light therapy devices and their duration can be a barrier for some individuals.
3	Light therapy is generally safe and does not cause side effects.	Regularity and consistency in performing light therapy can be a challenge for some individuals.
4	Light therapy can be performed at home or at work, providing flexibility in its use.	The long-term effects of light therapy on health still need to be studied further.

One of the advantages of light therapy is its clinically proven effectiveness. Many studies have shown that morning light therapy can reduce symptoms of depression in people with Seasonal Affective Disorder. This provides hope for individuals suffering from this condition to get effective help in managing their symptoms. Apart from that, light therapy also has the advantage of being non-invasive. Unlike some other forms of treatment that involve the use of drugs or invasive procedures, light therapy involves exposure to high intensity light, but does not require the use of chemicals or other physical interventions. Another advantage of light therapy is the lack of side effects associated with it. Light therapy is generally safe and does not cause significant side effects, which is a huge advantage for individuals looking for a treatment alternative that does not pose additional risks to their health. Flexibility is another aspect that makes light therapy attractive to many individuals. Light therapy can be done at home or at work, without requiring a visit to a healthcare facility. This makes it easy for individuals to integrate light therapy into their daily routine without disrupting daily activities.

Even though it has a number of advantages, light therapy is also faced with a number of challenges that need to be overcome. One of the main challenges is limited access. Not everyone has easy access to the necessary light therapy devices. This could be due to financial, geographic factors, or even the availability of the device in the local market. Cost is another challenge often faced by individuals interested in using light therapy. Light therapy devices and their duration can be expensive, especially for individuals who do not have health insurance coverage that covers alternative treatments such as light therapy. Compliance is another important factor that is often a challenge in the use of light therapy. Regularity and consistency in performing light therapy can be difficult for some individuals, especially those with busy schedules or an inability to make time for daily light therapy sessions. Another challenge to be aware of is the uncertainty about the long-term effects of light therapy on health. Although light therapy has been shown to be effective in reducing symptoms of depression in people with Seasonal Affective Disorder, further research into its long-term effects is needed, including potential negative impacts or risks that may be associated with long-term use. In conclusion, light therapy offers a number of interesting opportunities in treating depressive symptoms in sufferers of Seasonal Affective Disorder. However, challenges such as limited access, cost, compliance, and uncertainty of long-term effects must be overcome to ensure that light therapy can be a reliable and accessible treatment option for individuals who need it.

CONCLUSION

The implications of the research state that light therapy has been proven to be an effective approach in reducing symptoms of depression in sufferers of Seasonal Affective Disorder (SAD). Through a series of studies and meta-analyses, the positive influence of light therapy on the mental health of people with Seasonal Affective Disorder is increasingly consistently proven. Light therapy, which involves exposure to intense, spectrum-rich light, can provide significant benefits in improving mood and reducing depressive symptoms in individuals experiencing seasonal depression, especially in the winter when sunlight exposure is reduced. Clinical studies, including randomized controlled trials (RCTs) and prospective cohort studies, have provided evidence that morning light therapy of certain intensity and duration can provide significant benefits in managing depressive symptoms in sufferers of Seasonal Affective Disorder. These positive results are also supported by a meta-analysis combining data from multiple studies, which shows that light therapy is consistently more effective than placebo in reducing depressive symptoms in sufferers of Seasonal Affective Disorder. However, light therapy also has challenges and factors that need to be considered when using it. Variations in the intensity, duration, and timing of light exposure can affect the effectiveness of therapy, and appropriate adjustments are needed to maximize the benefits for the individual. Additionally, the cost of equipment and availability of light therapy can also be a barrier for some individuals.

REFERENCES

Anderson, J. L., Glod, C. A., Dai, J., Cao, Y., & Lockley, S. W. (2009). Lux vs. Wavelength in light treatment of Seasonal Affective Disorder. *Acta Psychiatrica Scandinavica*, *120*(3), 203–212. https://doi.org/10.1111/j.1600-0447.2009.01345.x

Avery, D. H., Kizer, D., Bolte, M. A., & Hellekson, C. (2001). Bright light therapy of subsyndromal seasonal affective disorder in the workplace: Morning vs. afternoon exposure. *Acta Psychiatrica Scandinavica*, *103*(4), 267–274. https://doi.org/10.1034/j.1600-0447.2001.00078.x

Golden, R. N., Gaynes, B. N., Ekstrom, R. D., Hamer, R. M., Jacobsen, F. M., Suppes, T., Wisner, K. L., & Nemeroff, C. B. (2005). The Efficacy of Light Therapy in the Treatment of Mood Disorders: A Review and Meta-Analysis of the Evidence. *American Journal of Psychiatry*, *162*(4), 656–662. https://doi.org/10.1176/appi.ajp.162.4.656

Gordijn, M. C. M., 'T Mannetje, D., & Meesters, Y. (2012). The effects of blue-enriched light treatment compared to standard light treatment in seasonal affective disorder. *Journal of Affective Disorders*, *136*(1–2), 72–80. https://doi.org/10.1016/j.jad.2011.08.016

Hofmann, S. G., Asnaani, A., Vonk, I. J. J., Sawyer, A. T., & Fang, A. (2012). The Efficacy of Cognitive Behavioral Therapy: A Review of Meta-analyses. *Cognitive Therapy and Research*, *36*(5), 427–440. https://doi.org/10.1007/s10608-012-9476-1

Lam, R. W. (1994). Morning light therapy for winter depression: Predictors of response. *Acta Psychiatrica Scandinavica*, *89*(2), 97–101. https://doi.org/10.1111/j.1600-0447.1994.tb01494.x

Leu, S.-J., Shiah, I.-S., Yatham, L. N., Cheu, Y.-M., & Lam, R. W. (2001). Immune–inflammatory markers in patients with seasonal affective disorder: Effects of light therapy. *Journal of Affective Disorders*, *63*(1–3), 27–34. https://doi.org/10.1016/S0165-0327(00)00165-8

Magnusson, A., & Boivin, D. (2003). Seasonal Affective Disorder: An Overview: REVIEW. *Chronobiology International*, *20*(2), 189–207. https://doi.org/10.1081/CBI-120019310

Nussbaumer, B., Kaminski-Hartenthaler, A., Forneris, C. A., Morgan, L. C., Sonis, J. H., Gaynes, B. N., Greenblatt, A., Wipplinger, J., Lux, L. J., Winkler, D., Van Noord, M. G., Hofmann, J., & Gartlehner, G. (2015). Light therapy for preventing seasonal affective disorder. *Cochrane Database of Systematic Reviews*. https://doi.org/10.1002/14651858.CD011269.pub2

Pjrek, E., Friedrich, M.-E., Cambioli, L., Dold, M., Jäger, F., Komorowski, A., Lanzenberger, R., Kasper, S., & Winkler, D. (2020). The Efficacy of Light Therapy in the Treatment of Seasonal Affective Disorder: A Meta-Analysis of Randomized Controlled Trials. *Psychotherapy and Psychosomatics*, *89*(1), 17–24. https://doi.org/10.1159/000502891

Pjrek, E., Winkler, D., Stastny, J., Konstantinidis, A., Heiden, A., & Kasper, S. (2004). Bright light therapy in seasonal affective disorder – does it suffice? *European Neuropsychopharmacology*, *14*(4), 347–351. https://doi.org/10.1016/j.euroneuro.2003.11.003

Reichborn-Kjennerud, T. (1996). Response to light therapy in seasonal affective disorder: Personality disorders and temperament as predictors of outcome.

Journal of Affective Disorders, *41*(2), 101–110. https://doi.org/10.1016/S0165-0327(96)00076-6

Rohan, K. J., Lindsey, K. T., Roecklein, K. A., & Lacy, T. J. (2004). Cognitive-behavioral therapy, light therapy, and their combination in treating seasonal affective disorder. *Journal of Affective Disorders*, *80*(2–3), 273–283. https://doi.org/10.1016/S0165-0327(03)00098-3

Rosenthal, N. E. (1984). Seasonal Affective Disorder: A Description of the Syndrome and Preliminary Findings With Light Therapy. *Archives of General Psychiatry*, *41*(1), 72. https://doi.org/10.1001/archpsyc.1984.01790120076010

Stewart, J. W., Quitkin, F. M., Terman, M., & Terman, J. S. (1990). Is seasonal affective disorder a variant of atypical depression? Differential response to light therapy. *Psychiatry Research*, *33*(2), 121–128. https://doi.org/10.1016/0165-1781(90)90065-D

Swedo, S. E., Allen, A. J., Glod, C. A., Clark, C. H., Teicher, M. H., Richter, D., Hoffman, C., Hamburger, S. D., Dow, S., Brown, C., & Rosenthal, N. E. (1997). A Controlled Trial of Light Therapy for the Treatment of Pediatric Seasonal Affective Disorder. *Journal of the American Academy of Child & Adolescent Psychiatry*, *36*(6), 816–821. https://doi.org/10.1097/00004583-199706000-00019

Tyrer, A. E., Levitan, R. D., Houle, S., Wilson, A. A., Nobrega, J. N., Rusjan, P. M., & Meyer, J. H. (2016). Serotonin transporter binding is reduced in seasonal affective disorder following light therapy. *Acta Psychiatrica Scandinavica*, *134*(5), 410–419. https://doi.org/10.1111/acps.12632

Westrin, Å., & Lam, R. W. (2007). Long-Term and Preventative Treatment for Seasonal Affective Disorder: *CNS Drugs*, *21*(11), 901–909. https://doi.org/10.2165/00023210-200721110-00003

Wirz-Justice, A. (1993). Light Therapy in Seasonal Affective Disorder Is Independent of Time of Day or Circadian Phase. *Archives of General Psychiatry*, *50*(12), 929. https://doi.org/10.1001/archpsyc.1993.01820240013001

Wirz-Justice, A., Graw, P., Kräuchi, K., Sarrafzadeh, A., English, J., Arendt, J., & Sand, L. (1996). 'Natural' light treatment of seasonal affective disorder. *Journal of Affective Disorders*, *37*(2–3), 109–120. https://doi.org/10.1016/0165-0327(95)00081-X