Treatment options for seasonal affective disorder

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Mentor: Dr Nicholas Bradshaw

SVEUČILIŠTE U RIJECI
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Anja Horvat
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The thesis has 39 pages, 2 tables, 8 figures and 54 references.

Abstract

Seasonal affective disorder (SAD) is a subtype of major depressive disorder. It is a multifactorial disorder characterised by the seasonal appearance of its symptoms such as depressed mood, hypersomnia or insomnia, increased or reduced appetite… There are two types of seasonal affective disorder, based on the season when the symptoms appear – summer and winter type. The cause of the disorder has not yet been found, but there are a couple of hypotheses that suggest the possible origin of the disorder. They are called the photoperiodic and phase shift hypotheses, also known as the chronobiological hypotheses. Aside from them, the serotonin and melatonin disbalance may also contribute to the disorder. The goal of this thesis was to discover various treatment options for seasonal affective disorder. Well-known and used treatments are light therapy, cognitive behavioural therapy and pharmacotherapy. No treatment is significantly superior to the others, at least not in all aspects. Light therapy gives the fastest results, but cognitive behavioural therapy shows greater potential to lower the chances of relapse in the next season. Pharmacotherapy is mostly used as a combination treatment with either of the other two. Right now only two drugs have been found to work almost as effectively as light therapy – fluoxetine and bupropion, but they also have side effects. Two other treatments are dawn simulation and negative air ion therapy. Their effect is a little weaker but are still used in patients with milder symptoms. Because all mental illnesses are very hard to treat universally, medical doctors prescribe a combinatorial treatment consisting of more therapies to treat the symptoms in the best possible way for each patient individually.

Keywords: seasonal affective disorder, SAD therapy, light therapy, cognitive behavioural therapy, pharmacotherapy

Sažetak

Sezonska depresija je podvrsta kliničke depresije. To je multifaktorijalni poremećaj kojeg karakterizira sezonska pojava simptoma kao što su depresivno raspoloženje, hipersomnija ili insomnija, povećan ili smanjen apetit… S obzirom na godišnje doba u kojem se simptomi pojavljuju, razlikujemo zimski i ljetni tip sezonske depresije. Iako je uzrok poremećaja i dalje nepoznat, postoji nekoliko teorija koje predlažu mogući uzrok. Radi se o teorijama fotoperioda i faznih pomaka, zajedno nazvanim i kronobiološke teorije. Neuravnoteženost serotonina i melatonina bi također bi također mogle pridonijeti poremećaju. Cilj ovog rada je proučiti različite metode liječenja ovog poremećaja. Dobro poznati i najčešće korištene metode su terapija svijetlom, kognitivno-bihevioralna terapija i farmakoterapija. Ni jedna metoda se ne smatra najboljom, barem ne u svim aspektima. Terapija svijetlom pokazuje najbrže rezultate, ali kognitivno-bihevioralna terapija ipak pokazuje najveći potencijal u sprečavanju ponovne pojave simptoma u sljedećoj sezoni. Farmakoterapija se uglavnom koristi kao kombinacija sa jednom od dvije prethodno navedene metode. Trenutno su samo dva lijeka uspješna kao i terapija svijetlom, fluoxetin i bupropion, ali oni imaju i svoje nuspojave. Druge dvije metode koje se malo rijeđe koriste za liječenje su simulacija zore i terapija negativnim ionima iz zraka. One imaju malo blaži efekt, ali se zato koriste kod pacijenata sa blažim simptomima. Sve mentalne poremećaje je teško liječiti na jedan univerzalan način, tako i za sezonsku depresiju liječnici pripisuju kombinaciju dostupnih metoda kako bi najbolje tretirali svakog pojedinog pacijenta.

Ključne riječi : sezonska depresija, terapija za SAD, terapija svijetlom, kognitivno-bihevioralna terapija, farmakoterapija

Contents

1. Introduction to seasonal affective disorder

Depression is a mood disorder that causes feelings of sadness and loss of interest in most previously enjoyable activities. There are many types of depression, but the one that is most known among the general public is clinical depression or major depressive disorder. Major depressive disorder is characterized by depressed mood, significant change in weight and appetite, insomnia or hypersomnia, fatigue, reduced ability to think and focus etc. Depressive episodes usually last at least two weeks, though in most cases they are much longer. If these episodes occur at a certain time of year, for a couple of years in a row, the disorder in question can be explained as depression with a seasonal pattern, also known as seasonal affective disorder (SAD) (1).

According to the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5), SAD is currently classified as a recurring major depressive disorder with a seasonal pattern whereas in the International Statistical Classification of Diseases and Related Health Problems (ICD) it is classified as a recurrent depressive disorder. Following the guidelines of DSM-5, for SAD to be diagnosed in a patient, depressive symptoms (see Table 1) should appear during the same period of the year for at least two consecutive years. According to the ICD, a depressive disorder is recurrent when the depressive episodes appear repeatedly without any history of mania, which is described as "independent episodes of mood elevation and increased energy". The ICD does however include hypomania as a possible occurrence right after a recurrent depressive episode (2). There are two major types of seasonal depression – winter and summer type. Winter depression, the more common type, is characterised by the onset of its symptoms in fall or winter, and full remission in summer. Alongside the depressed mood, the usual symptoms of this SAD type are hypersomnia, hyperphagia and carbohydrate

cravings usually followed by weight gain. These symptoms are considered atypical when it comes to major depressive disorder. In contrast to the winter type, the summer type SAD is characterised by the onset of the symptoms in spring or summer and full remission in winter. The symptoms are similar to those connected to major depressive disorder – the patients tend to develop insomnia and lose weight (3).

Table 1 Symptoms of major depressive disorder adapted from (1)

Depressed mood most of the day and nearly every day, irritable mood (in children and adolescents) *,**
Diminished interest or pleasure in (almost) all activities most of the day and nearly every day *, **
Significant weight loss or weight gain (>5% body weight in a month), decrease or increase in appetite nearly every day
Insomnia or hypersomnia nearly every day
Psychomotor agitation or retardation nearly every day **
Fatigue or loss of energy nearly every day
Feelings of worthlessness or excessive or inappropriate guilt (may be delusional) nearly every day
Diminished ability to think or concentrate, or indecisiveness, nearly every day *, **
Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide

* subjective report

** observable by others

According to the World Health Organisation (WHO), in the year 2017, over 300 million people were estimated to suffer from depression, which would make it 4.4% of the world's population (4). In the year 2022, the Global Health Data Exchange estimates that 251 – 300 million people in the world suffer from depression, making it 2.5% - 6.5% of the world population (5). Sadly, there are not many prevalence studies that would show the global results for SAD. The studies that have been made, however, suggest that the prevalence is influenced by latitude. The prevalence should rise as we travel further north due to greater photoperiodic variations around the poles (6). Table 2 shows the results of some prevalence studies.

Table 2 The prevalence of SAD at different latitudes

Location	Latitude (°N)	Prevalence (%)	Adapted from
Greenland	64	6.9	(7)
	70	11.5	
Australia	-37.8	0.7	(8)
Netherlands	~52	3	(9)
Finland	68-70	9.6	(10)
Iceland	~64	3.8	(11)
Canada	50.5	1.2	(12)
Japan	35	0.86	(13)
Italy	~41	4.4	(14)
Nashua	42.5	9.7	(15)
New York	40	4.7	
Montgomery County	39	6.3	
Sarasota	27	1.4	

The results are quite inconsistent with the suggestion that the prevalence is influenced by latitude. To determine the exact relationship between latitude and prevalence further research is required.

A nationwide registry-based study made by Fellinger *et al.* in 2015 has shown that there is no significant difference in depressive symptoms between men and women. Moreover, they have found that the symptoms are more pronounced in patients that are not older than 55 (16). In some older studies, however, it has been shown that most of the patients tend to be younger women (12,14). Further research is necessary to determine the exact facts.

2. Purpose of this thesis

In this thesis, I aim to investigate the currently available literature about the treatment options for seasonal affective disorder – what the treatment is, how it is done, what principles it works on and what results it provides in the end. I also wish to compare the available treatment options, and if possible determine which treatment, or combination of treatments is best.

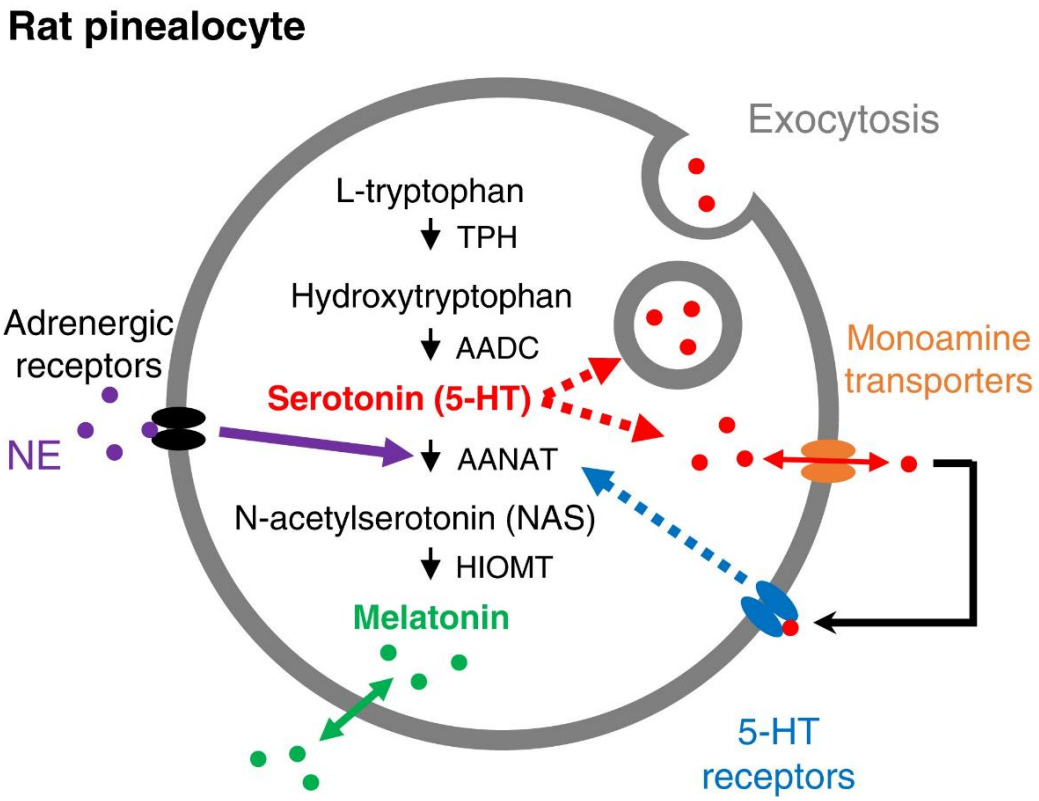
3. Treatment

SAD requires, as any other mental illness, a very individual approach when deciding on proper treatment. That is because it's presumed that SAD is a multifactorial illness. Mechanisms related to chronobiology such as circadian rhythm (17), neurotransmitter (dis)balance, in particular related to serotonin (18,19) and melatonin (20–22) levels, and photoperiodism (23) are all possible causes of the illness. Even though the exact cause of SAD development is still to be discovered, there are a couple of hypotheses as to why SAD occurs. Aside from genetics, these hypotheses mostly revolve around two related hormones – melatonin and serotonin. Melatonin is a hormone that is regulated by the suprachiasmatic nucleus in the pineal gland of the anterior hypothalamus. This small part of the brain receives photoperiodic information gathered from the melanopsin cells that can be found in the retina in the eye. The biosynthesis of melatonin (see Figure 1) starts with the amino acid tryptophan, which is also the precursor of serotonin, making serotonin the precursor for melatonin. When the amount of environmental light detected in the retina is very low, the neurotransmitter norepinephrine starts the signalling pathway to begin serotonin conversion into melatonin (22). Because melatonin biosynthesis is regulated by the detection of environmental light, it is reasonable to assume that during the winter months, when daylight time is shorter, melatonin would be produced more than in the spring and summer months.

Serotonin (5-hydroxytryptamine, 5-HT) is a neurotransmitter and a hormone that controls mood and that's why it is commonly known as "the happiness hormone". Its biosynthesis (see Figure 1) heavily depends on sunlight exposure and that is because of vitamin D (sometimes known as the sunshine vitamin because of its biosynthesis). Vitamin D acts as an activator for tryptophan hydroxylase 2, an enzyme that starts the conversion of

tryptophan into serotonin. With lower light exposure, the human body cannot synthesise enough vitamin D and consequentially serotonin that would keep the person in a better mood (24). Serotonin's importance is also seen in its signalling ability, as it has been found that it acts as an autocrine neurotransmitter in the pineal gland alongside norepinephrine, making melatonin production even stronger (25). Research has found that there is a seasonal variation between fall/winter and spring/summer in serotonin transporter binding which makes serotonin a very good target for drug research and development to treat atypical depressive symptoms. Aside from serotonin, other neurotransmitters such as norepinephrine are also suspected to play a role in the development of SAD (18,26,27).

Figure 1 Biosynthesis of serotonin and melatonin taken from (25)



The two best-studied hypotheses, also known as chronobiological hypotheses, that could explain winter-type SAD are the phase shift hypothesis and the photoperiod hypothesis. Both of these revolve around the circadian rhythm and its master clock, the suprachiasmatic nucleus. The phase shift hypothesis suggests that the shortness of day causes irregularities in the circadian rhythm (the sleep-wake cycle). The circadian phase is commonly measured with the rise of melatonin levels, which is in the evenings when sunlight exposure lowers (28). It is generally believed that in winter type SAD, due to earlier sunsets melatonin onset appears earlier than usual, causing a circadian phase shift (an advance or delay). This causes a person to exchange a small portion of the day for the night. However, this is easily corrected with light therapy (20). The photoperiodic theory suggests that due to the shortness of day in the winter months melatonin is produced far more than during summer because the melatonin onset is moved earlier, so patients tend to sleep more and spend less time actively (23).

Commonly used therapy methods are light therapy, pharmacotherapy, and cognitive-behavioural therapy, but aside from them, there are also dawn simulation and negative air ions that could be used to treat the illness. The doctors also recommend regular exercise.

3.1. Light therapy

Light therapy is a method that uses light to treat mood disorders such as chronic depression, premenstrual depression, bipolar depression, and disturbances in the sleep-wake cycle (insomnia, hypersomnia), though usually it is associated with SAD. It has also been found that it helps with attention deficit hyperactivity disorder (ADHD) in adults (29). Light therapy is the most studied therapy method for SAD. Medical doctors give this method credit because many patients experience lighter symptoms after a short time of the therapy session (30). The therapy could also serve in explaining the aetiology of the disorder, specifically the phase shift and photoperiodic hypotheses. What makes this therapy great is that the patient can do it in their own home while doing a simple task that involves sitting down, such as reading.

The standard procedure is to have a patient sit in front of a light source of 10000 lux for 30 minutes. It is recommended that when using light sources of lower intensity, the treatment should be extended. For example, a session with a light source of 2500 lux should last at least 2 hours. Generally, the patient should be positioned about 60 – 80 centimetres away from the light source and should most definitely not stare directly at the light source to prevent causing damage to their eyes. It is enough that the light can enter the eye at an angle of 30-60° (29). Some suggest that the light source be positioned closer to the patient or to start with milder light intensity for longer periods (19). For example, in a study by Pail *et al.,* they recommend the starting dose to be 2 hours in front of light intensity of 2500 lux. As time goes on, the therapy should be modified, depending on the symptom improvement or impairment (29). Some of the possible light sources are light boxes, light visors, dawn simulators or light emitting diodes (LEDs) (31–34). A modern light box often called a “sad lamp”, is a device that comes in different shapes and sizes and usually emits white light with an

intensity of up to 10000 lux which is the maximum intensity. There is not much difference between a light box and a light visor other than the light visor allows its user to move around freely while using it and it comes in the shape of a cap.

Figure 2 Light box

Figure 3 Light visor

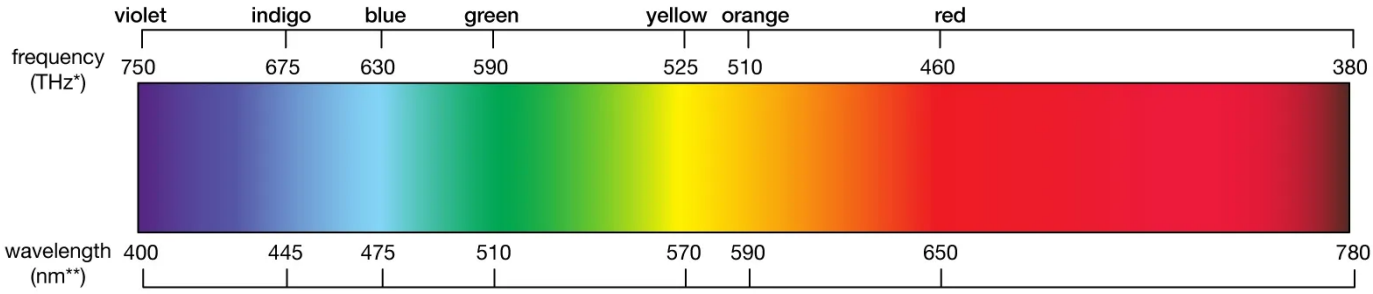
taken from https://northernlighttechnologies.com/sad-light-store/boxelite-desk-lamp-2 and https://northernlighttechnologies.com/sad-light-store/feel-bright-light-visor

There have been debates about whether pure white light or just a part of the spectrum is best when using light therapy. In 2006, Glickman and Byrne decided to research the effect of narrow-band blue light on SAD patients. They used the wavelength of 468 nm, mainly because it was the safest wavelength of the entire blue spectrum (the wavelength section from 435 to 445 nm is hazardous at high intensities). The patients treated with blue light LEDs had more benefits from their treatment than those treated with red light LEDs (controls). They have concluded that narrow band blue light LEDs could potentially be a very good option for light treatment (32). Research

has also been made on the effectiveness of other wavelengths on SAD. Red light, for example, had relatively no effect and is thus usually used as a control when testing other wavelengths. Green light however has proven more potent than red light with an effect very similar to that of white light (35). One certain rule is that white light must have the ultraviolet spectre filtered out because it is harmful to the human body and has not shown any statistically significant improvement in depressive symptoms. Research has shown us that the broad-spectrum white light with the UV spectre used to treat SAD had the same effect as the broad-spectrum white light without the UV spectre (32).

Figure 4 The visible light spectrum

adapted from https://www.britannica.com/science/light



There have been debates about which time of day is best to start light therapy and it has been shown multiple times that morning sessions had the best remission rate (36,37). Researchers argued that this is because of the phase shift hypothesis. When a circadian phase delay occurs in the evening, it can easily be corrected by a morning session which would cause a phase advance and therefore even it out (36–38). In contrast, noon sessions have shown little to no remission rate as well as evening sessions. Evening sessions have also been found to cause insomnia as a side effect (37).

There is always a possibility of side effects appearing. The most common ones are headache, nausea or vomiting, eye strain, blurred vision, agitation and sometimes insomnia. There is the possibility of triggering a manic or hypomanic episode in susceptible patients. These may be the result of light intensity, however in comparison to the side effects of pharmacotherapy, they are much milder, and they remit quickly with the reduction of the light intensity or the session length (32).

The most important thing to do when using light therapy is to be consistent and compliant because this type of treatment can only suppress symptoms if actively applied. The treatment should be started with the occurrence of the first symptom until the usual time of remission, which is spring. Research made by Reeves and al. has shown that there is a slight but rapid improvement in SAD symptoms after just two hours of one treatment (30). It has been proved in research made by Rohan et al. that light therapy is the fastest therapy option compared to pharmacotherapy and CBT and that is because it supposedly alternates circadian rhythms. However, the patients that have participated in the research have been found to experience the symptoms two years after the initial treatment, meaning that light therapy might not be the best long-term therapy option (39).

3.2. Cognitive-Behavioural therapy (CBT)

Cognitive-behavioural therapy (CBT) includes traditional treatment components of behavioural activation, cognitive restructuring, and relapse prevention. In other words, through conversation with a professional the patient is supposed to identify and schedule enjoyable activities, record and modify negative automatic thoughts and core beliefs and in the end, use these newly learned skills to prevent their relapse. This therapy includes twelve 90-minute group sessions over six weeks (39).

Meyerhoff et al. conducted research about depressive symptom remission during the treatment of SAD with CBT and light therapy. They included 17 symptoms, and for 13 of them, the remission rates did not differ in time between the use of CBT or light therapy. However, four symptoms have been found to have faster remission with light therapy than with CBT and those are insomnia, hypersomnia, psychic anxiety, and social withdrawal. Two of those symptoms are related to sleep so they believe that light therapy would be more effective for them than CBT because it affects the circadian rhythm (40).

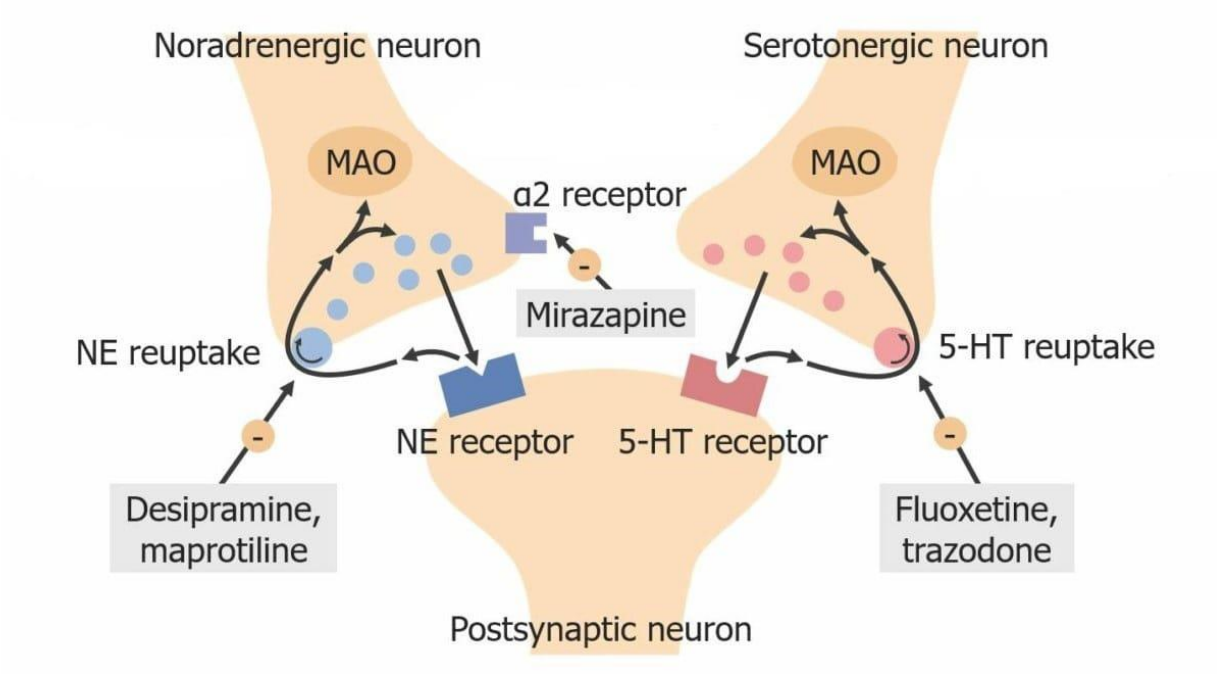
Studies have shown that cognitive-behavioural therapy is a great long-term therapy option. One reason may be because it involves regularly scheduled meetings over a small period, which is sometimes easier than doing light therapy by yourself at home, where you are not under anyone's control (39). In 2016, Rohan et al. decided to research possible outcomes two winters after acute treatment of SAD with CBT and light therapy. At the first winter follow-up, there were no statistically significant differences found between the two treatments, however, at the second winter follow-up, CBT was found to be statistically superior to light therapy. CBT was associated with fewer recurrences than light therapy (27.3% vs. 45.6%) and more remissions than light therapy (68.3% vs. 44.5%). The researchers decided to examine the association between the results from two winters and found that CBT

patients with no recurrence in the first winter had five times more chance of not having a recurrence in the second winter as well, when in contrast the light therapy patients had only twice as much chance (39).

3.3. Pharmacotherapy

The biggest problem with light therapy and CBT is that they are time-consuming. Many patients feel unable to integrate light therapy into their daily routines or do not have the time to attend group counselling more times a week, which leaves these two therapy options insufficient to relieve the patient's symptoms. This is where pharmacotherapy can offer advantages over previously mentioned therapies. The most effective medicine to treat depressive symptoms are second-generation antidepressants (SGAs). Their mechanism of action is to affect the neurotransmitters in the central nervous system. SGAs can be classified into three groups, with each group affecting a different neurotransmitter or groups of neurotransmitters. These are selective serotonin reuptake inhibitors (SSRIs), serotonin and norepinephrine reuptake inhibitors (SNRIs) and other SGAs (26). SSRIs such as citalopram, fluoxetine, sertraline and paroxetine inhibit serotonin reuptake at the presynaptic neuronal membrane. SNRIs such as milnacipran, venlafaxine, and duloxetine work in the same manner – by inhibiting presynaptic norepinephrine and serotonin reuptake. This way, both the SSRIs and SNRIs allow serotonin and norepinephrine to reach the postsynaptic neuron and pass the message to further nerve cells, which is the usual antidepressant mechanism. Other SGAs include mirtazapine, which has an opposite mechanism of action to SSRIs and SNRIs. Mirtazapine acts as an antagonist of the presynaptic alpha-2 receptors that inhibit norepinephrine release and as a serotonin 5-HT2 and 5-HT3 receptor antagonist (26,41). By blocking these receptors, it enhances both noradrenergic and serotonergic neurotransmission through the other 5-HT receptors (42).

Figure 5 SGA mechanisms



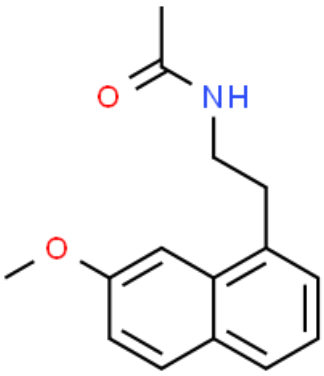
adapted from https://www.lecturio.com/concepts/serotonin-reuptake-inhibitors-and-similar-antidepressant-medications/

Bupropion is a neuronal reuptake inhibitor of norepinephrine and dopamine and as such one of the other SGAs. Unlike other SGAs, bupropion does not affect serotonin whatsoever (43). It is the most prescribed antidepressant for depression and has the largest evidence base in the preventive treatment of SAD (43,44). It has been proven that bupropion yields far better results than the placebo and comparable results to light therapy in depressive symptom remission. Bupropion is a generally well-tolerated antidepressant with the most common side effects as agitation, constipation, insomnia, dry mouth, headache, nausea, vomiting and tremor. The FDA has approved bupropion for the treatment of SAD, but its consumption is being watched as it could easily be abused because of its effect on the dopaminergic system (43,44).

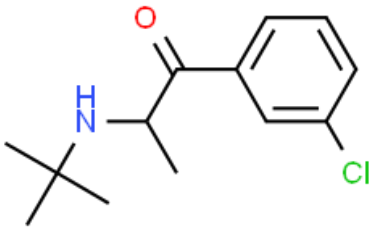
Fluoxetine is one of the most researched medications, alongside bupropion. Fluoxetine has shown a significant difference in treatment for SAD in comparison to a placebo, but no significant difference from light therapy (45). Both treatments were generally well tolerated and only sleep disturbance has shown to be a statistically significant side effect in fluoxetine treatment. Light therapy did however have a slightly faster onset of effect – the symptom remission in light therapy occurred after a week and in fluoxetine after two weeks (45).

Aside from these drugs, other drugs such as citalopram, escitalopram, melatonin, agomelatine, sertraline and moclobemide have also been tested against placebo. All have shown to be superior to placebo, but require further research to evaluate their clinical value for SAD(21,46–50).

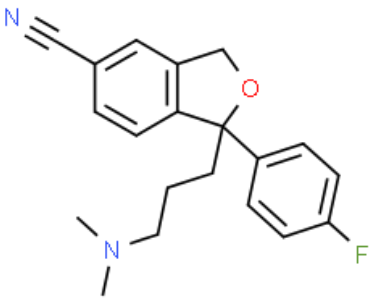
Figure 6 Second-generation antidepressants taken from http://www.chemspider.com/



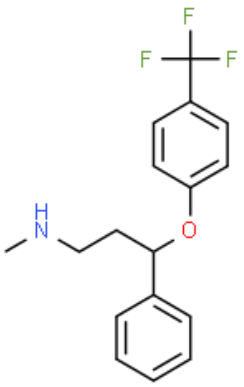
Agomelatine



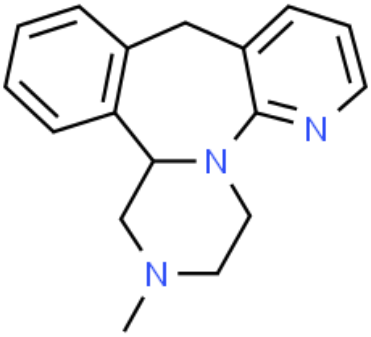
Bupropion



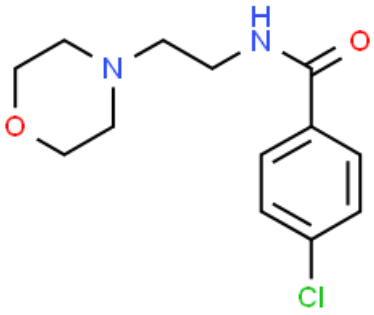
Citalopram



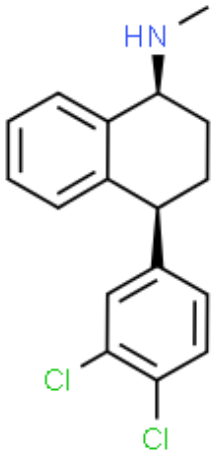
Fluoxetine



Mirtazapine



Moclobemide



Sertraline

Dawn simulation

Dawn simulation is a more natural version of bright light therapy. A machine called a dawn simulator (see Figure 4) creates an artificial dawning effect by projecting light onto the patient's closed eyes during the last 30 minutes of the patient's sleep. The dawn simulator should be placed about 90 cm away from the pillow. When the alarm goes off, the dawn simulator projects a light off about 0.25 lux, which is similar to starlight and is supposed to imitate the first sun's rays. Over the 30-minute session, the light intensity is enhanced up to 250 lux, which is the sunlight intensity during sunrise (51). For an "extra energy charge" the patients have been told to put the dawn simulator closer (30 cm away from the pillow) to them immediately upon waking and have an extra 15-minute session with a light intensity of 250 lux (34).

Figure 7 Dawn simulator taken from
https://northernlighttechnologies.com/sad-light-store/dawnsimulator

In comparison to bright light therapy, dawn simulation has a very similar effect and has been proven a great treatment. Danilenko and Ivanova gathered a group of 40 people and tested them for both bright light therapy and dawn simulation. The results have shown that most people (21 out of 40) prefer bright light as a long-term therapy because of its faster and stronger effect and because a light box is easier to set up. However, dawn simulation was preferred for its more natural and softer effect, especially in cases when bright light caused eyestrain, and because it saves a lot more time in the mornings (34).

3.4. Negative air ion therapy

Negative air ion therapy uses an ion generator (see Figure 5) to create negative ions from molecules (O_2, N_2, CO_2) that find themselves in the air around the generator. This way it relieves depressive symptoms. Its mechanism is far from clear, but it is believed to affect emotional processing (52).

Figure 8 An ion generator taken from
https://www.invisiclean.com/invisiclean-stella-5-in-1-air-purifier.html

There are high- and low-density ion generators and their main difference is the obvious rate of ion release per second. For example, in research from 2006 made by Terman and Terman, high-density generators released $4.5*10^{14}$ ions/second while low-density generators released $1.7*10^{11}$ ions/per second. Number of ions released per second is adjustable. The generator is usually placed at the patient's bedside at least about 70 cm

above the floor and directed towards the pillow at a maximum distance of 60 cm. The generator releases negative air ions for 30-60 minutes. Research has shown that negative ion therapy significantly relieves SAD symptoms, high-density more so than low-density and in both cases does not result in any side effects (51–54).

4. Conclusion

Seasonal affective disorder is, without doubt, a serious problem in the modern world alongside any other mental disorder. Firstly, it is still not properly recognized as a subtype of depression but as just one of many variations in both the DSM-5 and the ICD. Secondly, the incidence rate between men and women is inconsistent – some studies have shown that younger women were affected by the disorder more than men and others have shown no significant difference between the two. Thirdly, it is still unknown whether there is a connection between the prevalence and latitude. Finally, its cause is still unknown. The existing theories have some leverage in the research that has been made up to now, but the exact cause is far from found. We could theorize that based on both phase shift and photoperiodic hypothesis, serotonin and melatonin are tightly connected and affect each other greatly. Elevated melatonin in the body would cause a person to spend more time sleeping or exchange night for day, meaning that the person would spend less time in the sun and wouldn't be able to produce enough vitamin D and consequentially serotonin, causing them to be in a constant low mood. We could also theorize that these two hormones don't affect each other as much, apart from them having the same precursor. It is an area that requires a lot more research.

The treatment options for SAD are not very diverse, considering that SAD is a multifactorial disease and like any other mental illness, not every treatment works the same for all patients. One certain thing is that people always prefer the option that is faster, cheaper and with fewer side effects. Medical doctors recommend light therapy as a starting point for all patients which could then be modified itself or by adding another therapy alongside it, for example, bupropion. Pharmacotherapy for SAD is still very unfamiliar territory. As we have seen, only two medications have been found more than

once to have a positive effect on SAD symptoms. Light therapy and pharmacotherapy are treatments that complement each other – while light therapy corrects the chronobiological symptoms, pharmacotherapy can correct the psychological ones and that's why their combination in treatment usually results in symptom remission. Though CBT makes the patient pay attention to their behaviour to try and correct it and has shown to prevent relapse the best, many patients accept this therapy as a last resort, because it is time-consuming. Ideally, it would be best to always combine all three treatments, to deal with all the symptoms and to prevent any possible future relapse in the patient, at least until a treatment that is effective in reducing and preventing the disorder in all patients has been found.

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