Shining Some Light On Seasonal Affective Disorder

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Overview

1. Introduction
2. Signs & Symptoms
3. Epidemiology & Risk Factors
4. Pathophysiology
5. Diagnosis
6. Treatment
7. Conclusion & Future Directions
Introduction
What is SAD?

- Subtype of Major Depressive Disorder related to changes in seasons
- Typically occurs at the same time of the year
- Occurs due to disruption of body’s internal biological clock
- Related to changes in Serotonin and Melatonin levels in the body

(Winkler et al., 2006) (Mayoclinic, 2017)
Signs & Symptoms
Nearly 10 hours of sleep during winter

Greater tendency for nodding off at work and less energy

Strong craving for carbs causes rise in tryptophan levels

Biological response to a seasonal drop in serotonin

<table>
<thead>
<tr>
<th>CLASSIC SYMPTOMS</th>
<th>OTHER SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oversleeping</td>
<td>Decreased sexual desire</td>
</tr>
<tr>
<td>Daytime fatigue</td>
<td>Lethargy</td>
</tr>
<tr>
<td>Carbohydrate craving</td>
<td>Hopelessness</td>
</tr>
<tr>
<td>Weight gain</td>
<td>Suicidal thoughts</td>
</tr>
</tbody>
</table>

(Burgo, 2014)
(Winkler et al., 2006)
Epidemiology & Risk Factors
Epidemiology

- Community based studies estimate SAD prevalence to be around 10% in northern latitudes

- Following DSM-IV-TR criteria SAD prevalence is:
  - 1-2% in the United States
  - Around 2% in Canada

- Higher incidence among women, especially during childbearing years
  - Female-to-male ratio of 4:1

(Miller, 2005)
(Kurlansik, 2012)
Risk Factors

Deprivation of natural light sources

Being female

Living farther away from equator

Family history

Younger age

(Byrne, 2008)
Pathophysiology
The body clock
Circadian Rhythms

(Puniewska, 2016) (Lam & Leviatan, 2000)
Photoperiod and Melatonin

Melatonin

- Light suppresses melatonin secretion
- Melatonin secretion abnormal in SAD patients
- Undetermined causal process

(Lam & Levietan, 2000)
Circadian Phase Shift

- Mismatch in circadian rhythm due to external factors
- Shift in natural and social clocks of individuals
- Shortened time length of overall circadian cycle

(Moussa, 2012) (Lam & Levietan, 2000)
### Neurotransmitters

<table>
<thead>
<tr>
<th>Serotonin (5-HT)</th>
<th>Norepinephrine</th>
<th>Dopamine</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fluctuate with seasons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Lowest in winter months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Low baseline level in SAD patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Depressive SAD symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Hypersomnia and increased eating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Low baseline level in SAD patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Low functional activity in SAD patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Levels stable year round</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Decreased eye-blink rates</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Lam & Levietan, 2000)
Genetics

Genetic Basis of SAD rates

Genetic Basis with Twin Study

Genetic Basis of Sex Factors

Table 2
Within-pair polychoric correlations of the SPAQ for each gender group

<table>
<thead>
<tr>
<th></th>
<th>MZ-M</th>
<th>DZ-M</th>
<th>MZ-F</th>
<th>DZ-F</th>
<th>DZ-O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep</td>
<td>0.42</td>
<td>0.32</td>
<td>0.32</td>
<td>0.27</td>
<td>-0.15</td>
</tr>
<tr>
<td>Social</td>
<td>0.36</td>
<td>0.20</td>
<td>0.33</td>
<td>0.06</td>
<td>0.02</td>
</tr>
<tr>
<td>Mood</td>
<td>0.53</td>
<td>0.26</td>
<td>0.33</td>
<td>0.27</td>
<td>-0.22</td>
</tr>
<tr>
<td>Weight</td>
<td>0.30</td>
<td>0.52</td>
<td>0.35</td>
<td>0.47</td>
<td>-0.04</td>
</tr>
<tr>
<td>Appetite</td>
<td>0.72</td>
<td>-0.15</td>
<td>0.46</td>
<td>0.11</td>
<td>-0.18</td>
</tr>
<tr>
<td>Energy</td>
<td>0.65</td>
<td>0.03</td>
<td>0.29</td>
<td>0.26</td>
<td>0.02</td>
</tr>
<tr>
<td>GSS?</td>
<td>0.69</td>
<td>0.12</td>
<td>0.45</td>
<td>0.26</td>
<td>-0.17</td>
</tr>
</tbody>
</table>

Because the GSS is a semi-continuous variable, Pearson’s r is given for this variable. (Jang et al., 1997)

Combined prevalence rates of seasonal affective disorder and subsyndromal seasonal affective disorder at different latitudes (line with squares) in three locations in the United States, Iceland, and among people of wholly Icelandic descent in Canada. (Magnusson & Axelsson, 1993)
Diagnosis
Diagnosis

- The first ever diagnosis criteria in the DSM was made by Rosenthal et al.
- No unique criteria in the DSM-IV
  - SAD is known as a specifier of recurrent major depressive episodes
- Important to determine the time of onset and offset of depressive episodes / rule out any other conditions

(Westrin & Lam, 2007) (Rosenthal et al, 1984)
Criteria for Seasonal Pattern Specifier

- **(A)** Regular temporal relationship between the onset of major depressive episodes and a particular time of the year
- **(B)** Full remissions (or a change from depression to mania or hypomania) also occur at a characteristic time of the year
- **(C)** Two major depressive episodes meeting criteria (A) and (B) in last two years and no non-seasonal episodes in the same period
- **(D)** Seasonal major depressive episodes substantially outnumber the nonseasonal episodes

(Reid & Wise, 1995)
Treatments
Phototherapy

- Bright light therapy in the winter
- Exposure to natural or artificial light suppresses brain’s secretion of melatonin
- 2500 lx of artificial light in the morning
- High intensity visible light emitted through light boxes
- Patients generally show response to treatment within the first week but exposure maintained for duration of winter
- Side effects: eyestrain, headache

(Partonen, 1998)
(Terman et al., 1989)
Drug Therapies

- Antidepressants (serotonin-reuptake inhibitors)
  - Sertraline
  - Fluoxetine
  - Moclobemide
Psychotherapy - CBT

- Preliminary studies
- Talk therapy
- Change patient’s automatic thoughts, dysfunctional attitudes, withdrawal and rumination
- Effective in preventing relapse

(Rohan et al., 2004)
Combined Treatment

- Combine phototherapy, psychotherapy and drug therapies
- Ideal for patients who have no response to phototherapy, psychotherapy or drug therapy alone
- Risk: overarousal

(Rodin, 1997)
Other Therapies / Prevention

(Rodin, 1997)
Conclusion & Future Directions
Conclusion & Future Directions

- Using Virtual Reality light therapy
  - Emulate the summer months through VR during the winter to help alleviate SAD symptoms

(Medeiros, 2017)


References


Thanks!

Any questions?