Parkinson’s Disease Associated Sleep Disturbance

Ehsan M. Hadi, MD, MPH.
Dignity Health Neurological Institute
Parkinson’s Disease

- 2nd most common neurodegenerative disorder
- Peak age at onset is 60 years
- PD risk increases with age, lifetime risk being 2%
- Positive FH increases risk to 4%
- Prevalence of PD is 1.8% over age 65 and is 2.6% at age 85-89
- Males to female ratio 3:2
Parkinson’s Disease

- Etiology remains multifactorial
- Due to loss of dopamine - producing brain cells
- ~70% DA loss for symptom manifestations
- Cardinal features:
  - Bradykinesia: slowness of movements
  - Tremor
  - Rigidity: stiffness
  - Postural instability: impaired balance and coordination
PD gives rise to a spectrum of cognitive/neurobehavioral and other non-motor symptoms that highly impact quality of life of patients.
PD Associated Sleep Disturbance

• Sleep benefit
  – Improvement in mobility and motor state the morning after drug intake at night
  – Recovery of dopaminergic function and storage
  – Circadian rhythm related phenomenon
  – Pharmacological response to dopaminergic medications
PD Related Sleep Disturbance

- **Sleep disorders** are significantly more common in PD compared to control - estimates have ranged from 60-98%.

- Sleep architecture studies in PD show:
  - Reduced total sleep time and sleep efficiency
  - Sleep arousals and fragmentation
  - Circadian variation of symptoms
  - Classified into the “morning better or worse”
PD – Sleep Disturbance

- **Insomnia**: defined as a recurrent difficulty to fall asleep or stay asleep, with daytime psychological or cognitive consequences
  - REM behavior (RBD), parasomnia, sleep apnea (OSA), excessive daytime sleepiness
- **Motor**: Restless legs (RLS), Periodic limb movements (PLM), Akinesia
- **Urinary**: Nocturia
- **Neuropsychiatry problems**: Depression, Vivid dreams, Altered dream content, Hallucinations, RBD, Non-REM-related disorder
Parkinson’s Disease Sleep Scale (PDSS)

How would you rate the following, based on your experience during the past one week. (Place a cross at the appropriate point on the line)

1. The overall quality of your night’s sleep is:
   - AWFUL
   - BAD
   - SATISFACTORY
   - GOOD
   - EXCELLENT

2. Do you have difficulty falling asleep each night?
   - ALWAYS
   - FREQUENTLY
   - OCCASIONALLY
   - RARELY
   - NEVER

3. Do you have difficulty staying asleep?
   - ALWAYS
   - FREQUENTLY
   - OCCASIONALLY
   - RARELY
   - NEVER

4. Do you have restlessness of legs or arms at night or in the evening causing disruption of sleep?
   - ALWAYS
   - FREQUENTLY
   - OCCASIONALLY
   - RARELY
   - NEVER

5. Do you fidget in bed?
   - ALWAYS
   - FREQUENTLY
   - OCCASIONALLY
   - RARELY
   - NEVER

6. Do you suffer from distressing dreams at night?
   - ALWAYS
   - FREQUENTLY
   - OCCASIONALLY
   - RARELY
   - NEVER

7. Do you suffer from distressing hallucinations at night (seeing or hearing things that you are told do not exist)?
   - ALWAYS
   - FREQUENTLY
   - OCCASIONALLY
   - RARELY
   - NEVER

8. Do you get up at night to pass urine?
   - ALWAYS
   - FREQUENTLY
   - OCCASIONALLY
   - RARELY
   - NEVER

9. Do you have incontinence of urine because you are unable to move due to “off” symptoms?
   - ALWAYS
   - FREQUENTLY
   - OCCASIONALLY
   - RARELY
   - NEVER

10. Do you experience numbness or tingling of your arms or legs which wake you from sleep at night?
    - ALWAYS
    - FREQUENTLY
    - OCCASIONALLY
    - RARELY
    - NEVER

11. Do you have painful muscle cramps in your arms or legs whilst sleeping at night?
    - ALWAYS
    - FREQUENTLY
    - OCCASIONALLY
    - RARELY
    - NEVER

12. Do you wake early in the morning with painful posturing of arms or legs?
    - ALWAYS
    - FREQUENTLY
    - OCCASIONALLY
    - RARELY
    - NEVER

13. On waking do you experience tremor?
    - ALWAYS
    - FREQUENTLY
    - OCCASIONALLY
    - RARELY
    - NEVER

14. Do you feel tired and sleepy after waking in the morning?
    - ALWAYS
    - FREQUENTLY
    - OCCASIONALLY
    - RARELY
    - NEVER

15. Have you unexpectedly fallen asleep during the day?
    - FREQUENTLY
    - OCCASIONALLY
    - RARELY
    - NEVER
    - NEVER
PD – Sleep Disturbances

- Excessive day-time sleepiness:
  - Disabling trend to doze or fall asleep in various circumstances that interferes with family, professional and social life
  - Results in poor attention, memory and hallucinations and predisposes to accidents
  - Effects approx 15-16% of PD patients
  - May be a primary feature of PD-differentiate from fatigue
PD – Sleep Disturbances

• Excessive day-time sleepiness

  – **Identify triggers**: Advancing disease, sleep habits, nocturnal sleep disruption- OSA, PLM, parasomnias, depression, drugs (dopaminergic, antihistamines, hypnotics, anxiolytics, SSRIs)

  – **Epworth sleepiness scale** (ESS): practical tool to assess severity

  – Consider sleep study or multiple sleep latency test to rule out primary sleep disorders
Use the following scale to choose the most appropriate number for each situation:

- **0 = would never doze**
- **1 = Slight chance of dozing**
- **2 = Moderate chance of dozing**
- **3 = High chance of dozing**

<table>
<thead>
<tr>
<th>Situation</th>
<th>Chance of dozing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting and reading</td>
<td></td>
</tr>
<tr>
<td>Watching TV</td>
<td></td>
</tr>
<tr>
<td>Sitting, inactive in a public place (e.g. a theatre or a meeting)</td>
<td></td>
</tr>
<tr>
<td>As a passenger in a car for an hour without a break</td>
<td></td>
</tr>
<tr>
<td>Lying down to rest in the afternoon when circumstances permit</td>
<td></td>
</tr>
<tr>
<td>Sitting and talking to someone</td>
<td></td>
</tr>
<tr>
<td>Sitting quietly after a lunch without alcohol</td>
<td></td>
</tr>
<tr>
<td>In a car, while stopped for a few minutes in the traffic</td>
<td></td>
</tr>
</tbody>
</table>

**Score:**
- **0-10** Normal range
- **10-12** Borderline
- **12-24** Abnormal
PD – Sleep Disturbances

- Excessive daytime sleepiness management
  - Avoid underlying triggers
  - Dopaminergic dose adjustment
  - Manage underlying sleep disorder
  - Modafinil, caffeinated products??
PD – Sleep Disturbances

• REM behavior disorder: (RBD)
  – Present in about 25-50% of PD patients
  – Has been linked with increased risk of developing PD
  – Precedes motor PD symptoms by years
  – Characterized by dream enactment during REM sleep
PD – Sleep Disturbances

- REM behavior disorder (RBD)
  - Leads to complex, **vigorous and sometimes violent behaviors** and in turn injury to self or bedpartner
  - Pathological basis unclear; thought to be related to the degeneration of lower brainstem nuclei - **pedunculopontine**, **subcoeruleal nucleus**
  - Polysomnography (Sleep study) required for definite diagnosis
PD – Sleep Disturbances

• REM behavior disorder (RBD) Management:
  – Avoid triggers- SSRI have been implicated
  – mild to moderate- none indicated
  – Conservative/ protective measures
  – Clonazepam- low doses
  – Melatonin 3-12mg doses
  – Pramipexole
  – Ramelteon
PD – Sleep Disturbances

- Restless legs syndrome:
  - Irresistible urge to move with associated discomfort, exacerbated by rest, relieved by movement
  - Associated with peripheral neuropathy, renal failure, iron/ folate deficiency
  - Medications implicated: antidepressants, neuroleptics, dopamine antagonist, sedating histamines
  - Treatment: Avoidance of triggers, iron supplementation, 
    - Pramipexole, ropinirole, L-dopa, Gabapentin, benzodiazepine, norcotics
PD – Sleep Disturbances

- Obstructive sleep apnea
  - Typically associated with increased body mass index (BMI)
  - 20-50% of normal BMI PD patients have been shown to have significant apnea
  - Typical features include snoring, breathing pauses, non-refreshing sleep
  - Snoring has been shown to predict EDS
  - Treatment: Weight loss, CPAP, etc.
Obstructive Sleep Apnea

STOP-Bang Questionnaire

1. Snoring: Do you snore loudly (loud enough to be heard through closed doors)?
   Yes           No

2. Tired: Do you often feel tired, fatigued, or sleepy during daytime?
   Yes           No

3. Observed: Has anyone observed you stop breathing during your sleep?
   Yes           No

4. Blood Pressure: Do you have or are you being treated for high blood pressure?
   Yes           No

5. BMI: BMI more than 35 kg/m²?
   Yes           No

6. Age: Age over 50 years old?
   Yes           No

7. Neck circumference: Neck circumference greater than 40 cm?
   Yes           No

8. Gender: Male?
   Yes           No

High risk of OSA: Yes to 3 or more questions
Low risk of OSA: Yes to less than 3 questions
General Principles

- Identify triggers/ medications etc.
- Optimize control of motor symptoms
- Relaxation techniques, cognitive therapy, biofeedback
- Regular sleep and wake pattern/ times
- Regular exercise and exposure to sunlight
- Reduce daily nap time
- Comfortable sleep environment
General Principles

- Regular meals
- Avoid excessive liquids, caffeinated beverages, alcohol in the evening
- Emptying bladder before bed, use condom catheter/ bedside commode
- Use the bedroom only for sleep and sexual activity
- Do not stay in the bed if not sleepy
References

- M.W. Johns 1990-97