Parkinson’s disease and sleep

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Waking up to sleep
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Parkinson’s (disease)

- James Parkinson (1755-1824)
- Progressive neurodegenerative disorder
- 3 cardinal features – bradykinesia, rigidity and tremor (+/- postural instability)
- Movement disorder
- Parkinsonism includes IPD, drug-induced PD, CVD, MSA, PSP, CBD, etc.
ICSD-3 (April 2014)

60 specific diagnoses within 7 major categories:
1. Insomnia
2. Sleep related breathing disorders
3. Central disorders of hypersomnolence
4. Circadian rhythm sleep-wake disorders
5. Parasomnias
6. Sleep related movement disorders
7. Other sleep disorders
Sleep disorders

• Insomnias

• Parasomnias

• Hypersomnias
Sleep problems in Parkinson’s

• Prevalence
  • studies suggest from 50 to 90% patients

• Most common reported sleep symptoms:
  • Cannot sleep
  • Urge to empty bladder
  • Legs moving and restless
  • Acting out dreams, kicking, shouting
  • Always tired
  • Falling asleep in the daytime
“In this stage, the sleep becomes much disturbed. The tremulous motion of the limbs occur during sleep, and augment until they awaken the patient, and frequently with much agitation and alarm.”
Sleep disorders

- Insomnia
- Parasomnia
- Hypersomnia
“...and at the last, constant sleepiness, with slight delirium, and other marks of extreme exhaustion, announce the wished-for release.”
Sleep disorders

- Insomnia
- Parasomnia
- Hypersomnia
Night-time sleep problems in PD

- Insomnia
- Vivid dreams
- Nightmares
- Night terrors
- REM sleep behaviour disorders
- Dopamine dysregulation syndrome
- Nocturnal confusion
- Visual misperceptions and hallucinations
- Nocturia/urgency
- Sleep-disordered breathing
- Restless legs (Ekbcom’s)
- Akathisia
- Periodic limb movement disorders
- Pain/parasthesia
- Muscle cramps
- Early morning dystonia
Soursop – tropical fruit containing anonacin, a mitochondrial toxin. (Consumption is associated with the atypical parkinsonism observed in Guadeloupe, in which almost all patients have REM sleep BD.)
Daytime sleep disorders in PD

- Fatigue
- Excessive daytime sleepiness
- Sleep attacks
- Restless legs syndrome
- Akathisia
- Visual misperceptions and hallucinations
- Daytime confusion
• 286 patients (190 male), median age 73 years (range 47-93), median duration of parkinsonian symptoms 5.1 years, were evaluated with the ESS.

• The median ESS score was 9 (range 0-23).

• 37.1% of patients scored >10 and in 23.1% the score was >=13.

• In the 75 patients who had symptom duration of less than 3 years, median score was 7 (range 0-22).

• In the 66 patients who had had symptoms for 10 or more years, median score was 10 (range 0-23).
ESS total scores

Patients from Exeter Movement Disorders Clinics

Audience at Waking up to sleep 14/05/2014

Epworth Sleepiness Scale total score

Epworth Sleepiness Scale total score (today)
High alertness: 10:00
Highest testosterone secretion: 10:00
Bowel movement likely: 08:30
Melatonin secretion stops: 07:30
Sharpest rise in blood pressure: 06:45
Lowest body temperature: 04:30
Deepest sleep: 02:00
Noon: 12:00
Best coordination: 14:30
Fastest reaction time: 15:30
Greatest cardiovascular efficiency and muscle strength: 17:00
Highest blood pressure: 18:30
Highest body temperature: 19:00
Melatonin secretion starts: 21:00
Bowel movements suppressed: 22:30
Causes of sleep disturbance 1

Arousal

Sleep regulation

Sleep/wake cycle
Sleep disturbances in PD - 1° causes

- Impaired thalamocortical arousal
- Degeneration sleep-regulating centres in midbrain and brainstem
  - Pedunculopontine nucleus (PPN) - ACh
  - Locus coeruleus - NA
  - Area peri-locus coeruleus - ?
  - Raphe nuclei in midbrain and pons – 5HT
  - Midbrain tegmental area – DA
  - Hypothalamus – Orexin/hypocretin
Causes of sleep disturbance 2

2° causes

Motor

Autonomic

Emotion

Sensory
Sleep disturbances in PD - 2° causes

- Motor
  - Nocturnal bradykinesia/akinesia
  - Hypnagogic tremor

- Sensory
  - Pain
  - Parasthesias

- Dysautonomia
  - Urgency
  - Nocturia
  - Orthostatic hypotension/hypertension

- Mood disturbance
  - Depression
  - Anxiety
Causes of sleep disturbance 3

- Antidepressants
- Analgesics
- Dopaminergic

Cross BBB
Sleep disturbances in PD - 3° causes

• Dopaminergic treatment
  • Dosage (too high or too low)
  • Timing of evening doses
  • Day/night-time fluctuations of response
  • Wearing off/end-of-dose deterioration

• Antidepressants

• Other drugs
  • Analgesics
  • Hypnotics
  • Antimuscarinics
Interaction between causes

1° causes

2° causes

3° causes
Sleep disturbances in PD - other causes

- Age related sleep changes
- Sleep hygiene
- Cardiac
  - Heart failure
  - Dysrhythmias
- Pulmonary
  - Sleep apnoea
  - Asthma
- Depression and/or anxiety unrelated to PD
Management

- Good history
- Do nothing
- Basic sleep hygiene
- Look at drugs
- Too much or too little dopamine stimulation?
- Pain
- Bladder
- (Hypnotics)
- Melatonin, sodium oxybate, modafinil.......
