BLUE LIGHT THERAPY FOR SLEEP IMPAIRMENT IN PARKINSON’S DISEASE

No registrations found.

Ethical review	Not applicable
Status	Recruiting
Health condition type	-
Study type	Interventional

Summary

ID

NL-OMON20179

Source
NTR

Brief title
Blue light in PD

Health condition

Parkinson's Disease, sleep, light therapy
Ziekte van Parkinson, slaap, lichttherapie

Sponsors and support

Primary sponsor: Radboud University Medical Centre Nijmegen
Source(s) of monetary or material Support: European Academy of Neurology

Intervention

Outcome measures

Primary outcome

The primary outcome of this study will be the change in Pittsburgh Sleep Quality Index score (PSQI).

Secondary outcome

The following parameter will serve as secondary outcome measures:

a. Motor Symptoms measurements:

- The MDS-Unified Parkinson’s Disease Rating scale (MDS-UPDRS) parts I-IV

b. Non- motor symptoms measurements:

- Sleep impairment: Epworth Sleepiness Scale (ESS), Global Impression of Clinical Change (GICC), sleep diary

- Cognition: Mini-Mental State Examination (MMSE), Montreal Cognitive Assessment (MoCA)

- Depression and Anxiety: Hamilton Depression Rating Scale (HADS)

Study description

Background summary

Rationale: Patients with Parkinson’s disease often suffer from sleep disturbances, in part due to circadian disruption. One strategy to potentially improve circadian rhythmicity is to introduce bright light therapy and thereby improving mood and sleep. In our study we propose a novel approach to light therapy using Propeaq light therapy glasses with integrated blue LED lights to replace traditional light boxes to further enhance light therapy in PD patients as well as improving study compliance.

Objective: The primary objective is to evaluate the efficacy of Propeaq light therapy glasses with integrated blue LED lights on sleep disorders in patients with Parkinson’s disease. Secondary objectives are to evaluate efficacy of Propeaq light therapy glasses with integrated blue LED lights on a wide range of motor symptoms as well as non-motor symptoms such as depression.

Study design: Pilot trail with single-blinded placebo controlled interventional design.
Study population: 20 patients with idiopathic Parkinson’s disease (both male and female) will be included to the study.

Intervention: Patients will be randomized to receive either blue light therapy (intervention) (n=10) or red light therapy (placebo) (n=10).

Main study parameters/endpoints: The primary outcome of this study will be the change in Pittsburgh Sleep Quality Index score after 2 and 5 weeks. Secondary study outcomes will be UPDRS scores along with its subscale scores, HADS, ESS, MOCA and GICC scores.

Nature and extent of the burden and risks associated with participation, benefit and group relatedness: The baseline and follow up assessments will be performed at the Radboudumc and will last approximately 3 hours. Patients will be randomly allocated to the intervention group (blue light therapy) or to the placebo group (red light therapy). Patients in both groups will wear the Propeaq light therapy glasses for one hour twice daily (total two hours each day). The first daily session will be scheduled one hour after waking up in the morning, the second session is one hour starting two hours before preferred bed time. The study is considered as low risk. Potential side effects of light therapy include headache, eye or vision-related complaints and nausea, all considered as mild to moderate in severity. These side effects are rare in people receiving light therapy (around 5%).

Study objective

Parkinson's disease (PD) is a neurodegenerative disorder characterized by the coexistence of motor and non-motor features. Sleep disturbances are among the most common (non-motor) symptoms occurring inup to 90% of PD patients and reducing quality of life and daytime functioning1-3. Sleep impairment may refer to diurnal or nocturnal symptoms with extensive daytime sleepiness (EDS), sudden sleep attacks during daytime as well as insomnia and restless leg syndrome (RLS) 4,5. Potential underlying causes of sleep disorders include motor symptoms (rigidity and bradykinesia), autonomic dysfunction (nocturia, diaphoresis), abnormal REM sleep behaviour (RBD), sleep apnoea, medication influence, neurodegeneration itself of central sleep regulatory areas such as the hypothalamus as well as age-related sleep changes6,7. Increasing evidence suggests that the suprachiasmatic nuclei (SCN), functioning as the circadian pacemaker and responsible for the endogenous physiologic cycles occurring on approximately a 24-hour cycle, is perturbed in PD8,9. These circadian cycles are synchronized to the environmental light or dark and to social activity cycles by zeitgebers (cues indicating environmental time)10. Light represents the most effective zeitgeber of the circadian timing system and supplementary exposure to light has beneficial effects on sleep quality and daytime vigilance in healthy older people and patients suffering from dementia11-13. In addition, dopamine neurotransmission plays an essential role in circadian rhythm regulation especially in promoting wakefulness. Dopamine is involved in retinal light adaptation, melanopsin and clock gene expression and influences circadian rhythmicity through selected central nervous system structures (raphe nuclei, locus coeruleus, hypothalamus and thalamus)8,9.

Several rodent models of PD have clearly demonstrated the pathological involvement of the SCN in PD, offering a potentially powerful and novel therapeutic target. The disturbance of circadian timing in PD also seems to have an impact on several other non-motor symptoms, including depressive symptoms and autonomic functions, as well as motor functions such as rigidity and bradykinesia14-16. As medication prescribed for sleep disturbances often results in side effects, there is a great need to develop and evaluate nonpharmacological approaches to manage not only sleep disorders in patients, but also many other symptoms which are related to the perturbation of circadian disruption.

Bright light therapy (BLT) was introduced to improve circadian rhythmicity as well as mood and sleep disorders. Firstly, a positive effect on sleep and mood was observed in the healthy general population but also in seasonal affective disorder and depression17. BLT was also

found to be useful in neurodegenerative disorders like PD. In previous studies patients diagnosed with PD received BLT with a light intensity of 1000 – 6000 Lux for 30- 90 minutes in the morning or prior to bedtime18-20. Results indicated noticeable improvement in mood, sleep and interestingly, in motor functions. Based on recommendation 10000 Lux should be used for 30 minutes and the time of administration should depend on the type of symptoms or patient's chronotype21. BLT is considered as a safe treatment option and only minor side effects have been reported such as: headache, eye or vision-related complains and nausea22. The effectiveness of BLT may be attributed to its zeitgeber function, which resets circadian rhythmicity reflected in a shift in serum melatonin concentrations. Studies have shown that blue light with a wave length in the range of 460–480 nm is more effective in entraining the SCN compared to monochromatic light with a wave length around 555 nm23,24. In addition, it has been observed that blue light around the 460 nm range is more effective in phase-shifting circadian output than exposure to white light of longer duration and higher irradiance25. Blue light therapy has been, for example, studied in otherwise healthy subjects in whom it increased alertness26,27 and improved cognitive functioning 28-30.

So far, five previous studies have used BLT (white light) in PD patients showing improvements in sleep and other non-motor symptoms after two weeks of therapy. Two studies have also shown an improvement in motor function (an overview is provided in section 6.3). These studies were, however, limited by either a small number of patients, retrospective design and most have made use of unwieldy light boxes. Also the option of blue light instead of white light as a treatment option has not been explored in PD. In our study we propose a novel approach to light therapy using Propeaq light therapy glasses with integrated LED lights emitting blue light with a 468 nm wavelength more specifically targeting retinal melanopsin and the retinohypothalamic tract and thereby more likely to effectively reset the SCN in PD patients31,32. Moreover, replacement of light boxes with glasses might positively influence the study compliance and repeatability of results as well as give further insights to underlying mechanisms of circadian disruption in PD.

Study design

During the pilot trial, patients will have three visits to the Radboudumc. Visit 1 at baseline, visit 2 after 2 weeks and visit 3 after 5 weeks. In between visit 1 and 2 patients will wear the Propeaq glasses every day for 2 hours and make an entry into their sleep diaries every day. During each of the visits patients will undergo testing and will be asked to provide information used to fill out several questionnaires. The following will take place at each of the visits:

- Visit 1 (baseline): collection of demographic and co-morbidity data, collection of PD related data, scoring of the following questionnaires and scales: MDS-UPDRS, ESS, GICC, MMSE, MoCA and HADS.

- Visit 2 (after 2 weeks): scoring of the following questionnaires and scales: MDS-UPDRS, ESS,

GICC, MMSE, MoCA and HADS.

- Visit 3 (after 2 weeks): scoring of the following questionnaires and scales: MDS-UPDRS, ESS, GICC, MMSE, MoCA and HADS.

Intervention

Intervention group:

Intervention will consist of blue light therapy being administered. Participants will wear the Propeaq light therapy glasses for one hour twice daily (total two hours each day). During the first daily session the participants will wear the glasses for one hour after they wake up in the morning and during the second session they will wear the glasses for one hour starting two hours before preferred bed time.

Control group:

Placebo will consist of red light therapy being administered using the same glasses as the blue therapy but with red coloured glass instead of blue coloured glass. The red light protocol will be identical to the blue light protocol again requiring the participants to wear the glasses twice daily for one hour (total two hours each day).

Each participant will use the blue light therapy for a total of two weeks or the red light therapy for two weeks as well.

Contacts

Public
Radboudumc, Department of Neurology, Post 935, route 935

Katarzyna Smilowska
P.O. Box 9101
Nijmegen 6500 HB
The Netherlands
Scientific
Radboudumc, Department of Neurology, Post 935, route 935

Katarzyna Smilowska
P.O. Box 9101
Nijmegen 6500 HB
The Netherlands

Eligibility criteria

Inclusion criteria

- Male or female subjects diagnosed with idiopathic PD according to UK Parkinson's Disease Society Brain Bank Clinical Diagnostic Criteria with Hoehn & Yahr stage 2-4

- Ability to obtain written inform consent (IC) for participation in the study

- Age of > 30 years (inclusively)

- Score of 5 or more on the Pittsburgh Sleep Quality Index score (PSQI) or Excessive daytime sleepiness (EDS) defined by an Epworth Sleepiness Scale (ESS) score of 7 or more

- Anti-PD treatment (such as levodopa formulations, dopamine agonists, selective MAO-B inhibitors, anticholinergic agents or amantadine) at a stable dose in the last 30 days prior to the initial screening assessment

Exclusion criteria

- Atypical Parkinsonism (Subjects with Parkinsonian features caused by disorder such as multiple system atrophy, progressive supranuclear palsy, dementia with Lewy bodies or multiple brain infarcts)

- Severity of Parkinson’s disease defined as stage 1 or 5 according to Hoehn & Yahr stages

- Significant cognitive impairment as defined by the Mini-Mental State Examination (MMSE) score <24

- Clinically significant psychiatric illness, including psychotic attacks, major depressive disorder (HAM-D = Hamilton Depression Rating Scale ≥14). Subjects with a lifetime history of suicidal attempt (including an active attempt, interrupted attempt or aborted attempt)

- Antidepressant treatment for less than 3 months prior to screening

- Participation in other, interventional, research studies

- Known conditions associated with sleep disorders other than PD or conditions inferring with the delivery of the blue light treatment:

Obstructive sleep apnoea syndrome

Eye-related diseases (e.g. cataract, glaucoma, blindness)

Any other condition that in the opinion of the investigator may interfere with the interpretation of the study results or constitute a health risk for the subject if he/she takes part in the study

Current or history of malignancy or migraine within 5 years before screening

Current use or use within three months prior the initial screening of hypnosedative or stimulant drugs such as benzodiazepines or melatonin

Study design

Design

Study type:	Interventional
Intervention model:	Parallel
Allocation:	Randomized controlled trial
Masking:	Single blinded (masking used)
Control:	Placebo

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	01-08-2017
Enrollment:	20
Type:	Anticipated

Ethics review

Not applicable

Application type:	Not applicable

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
NTR-new	NL6326
NTR-old	NTR6518
Other	Radboudumc Nijmegen : 105865

Study results

Summary results

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