Therapeutic potential of bright light therapy for the non-motor symptoms in Parkinson's disease

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To the Editor: Alterations of circadian rhythms seem to be the casual contribution to sleep disturbances, depression, and other non-motor symptoms in Parkinson's disease (PD).[1,2] By restoring the circadian rhythm, bright light therapy (BLT) might be a potentially new treatment option for PD. However, no studies have conclusively demonstrated the effects of BLT on the non-motor symptoms in PD.

Twenty-seven PD patients signed written informed consent and were included in this study. All the patients received 1 h of BLT (10,000 lux) daily within a time frame of 09:00 AM and 11:00 AM for 7 consecutive days. Participants were evaluated for motor and non-motor symptoms before and after the treatment, followed by the assessment of non-motor symptoms on day 28.

Finally, 23 PD patients completed the study [Figure 1]. Compared with the baseline, BLT significantly improved daytime sleepiness as assessed by Epworth Sleepiness Scale (ESS, 8.91 ± 5.43 *vs.* 8.26 ± 4.51, $P = 0.032$), sleep quality as assessed by Pittsburgh Sleep Quality Index (PSQI, 9.22 ± 4.74 *vs.* 7.65 ± 3.79, $P = 0.042$), and Parkinson's Disease Sleep Scale-2 (PDSS-2, 33.65 ± 13.78 *vs.* 35.96 ± 11.93, $P = 0.043$). In addition, there were significant differences in Montreal Cognitive Assessment (MoCA) scores (22.17 ± 4.44 *vs.* 22.91 ± 3.84, $P = 0.002$) and delayed recall section (1.74 ± 1.91 *vs.* 2.48 ± 1.75, $P = 0.000$) between pre- and post-light exposure. There was no significant change in motor symptoms and other non-motor symptoms like depression, anxiety, and autonomic functions. At follow-up, most rating scales that reflected improvement after light exposure were not statistically significant from baseline, except Hamilton Depression Rating Scale (HAMD, 7.96 ± 4.25 *vs.* 8.52 ± 4.03, $P = 0.006$). PD patients were divided into PD with EDS and PD without EDS based on ESS scores. Further analysis demonstrated significant improvement in daytime sleepiness in PD with the EDS group after light exposure.

The strengths of this study lie in the comprehensive assessments of the efficacy of BLT on the non-motor symptoms in PD patients. Besides, scores for each subscale were analyzed for spotting minor improvement of BLT. Finally, to the best of our knowledge, this is a rare report in China yet.

There are several limitations to this study. First, the sample size is relatively small and selection bias should be considered. Second, the control group is not included in this study; thus, the possibility of placebo effects could not be excluded. Besides, the place where patients received BLT is not a closed space; therefore, the external light environment changing with seasons could interfere with our experiment. Finally, our study lacks more objective data for clinical assessment, such as data from polysomnography, actigraphy, or data on dynamic changes of cortisol and melatonin.

To conclude, BLT for the PD population is still in its infancy. BLT might be a feasible treatment for ameliorating the sleep and cognitive functions in PD patients. Due to the relatively short intervention time and small sample size, the effects of BLT seemed to be mild and temporal. Further

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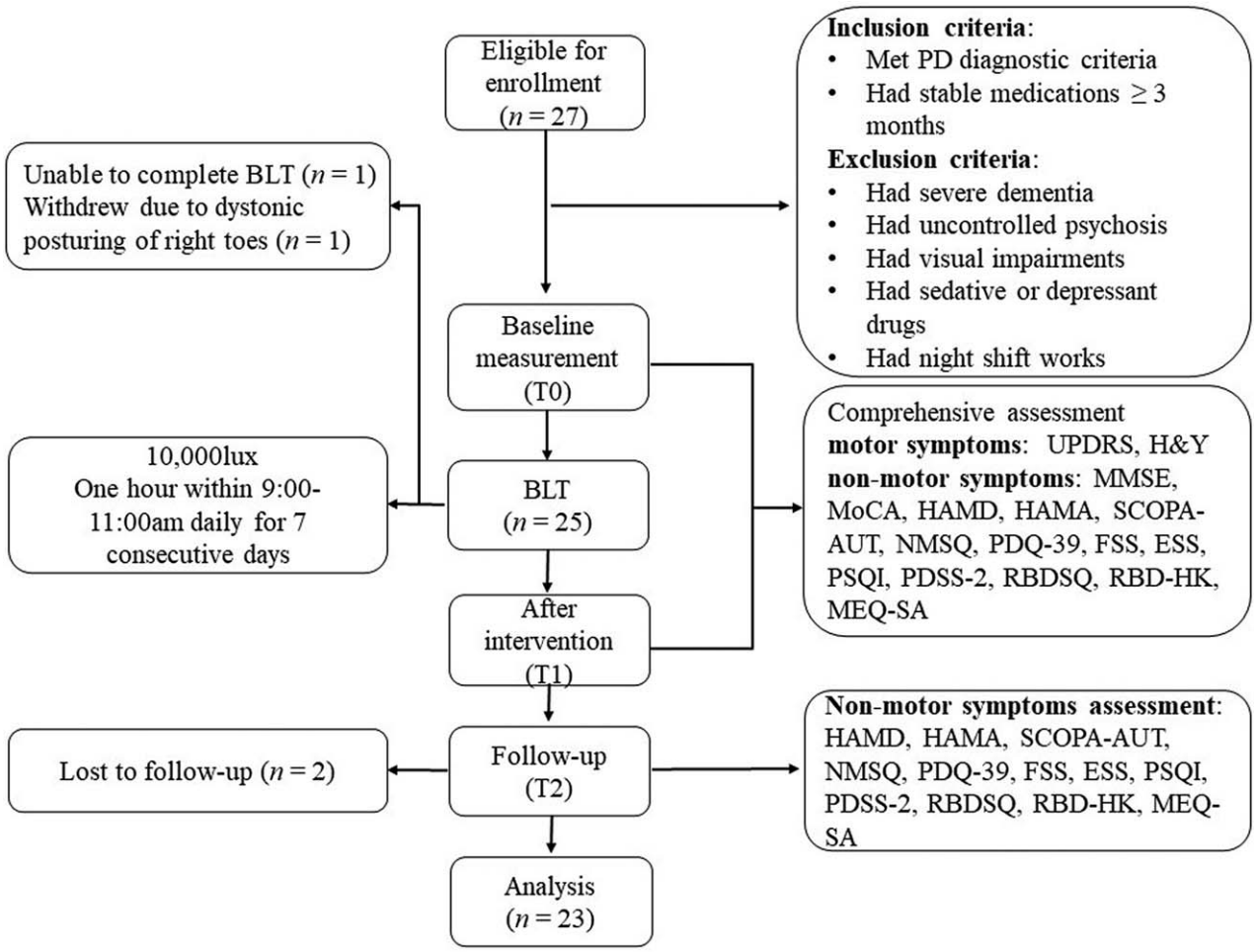

Figure 1: The flowchart of study design and patient enrolment. BLT: Bright light therapy; ESS: Epworth Sleepiness Scale; HAMD: Hamilton Depression Rating Scale; MoCA: Montreal Cognitive Assessment; PD: Parkinson's disease; PDSS-2: Parkinson's Disease Sleep Scale-2; PSQI: Pittsburgh Sleep Quality Index. UPDRS: Unified Parkinson's Disease Rating Scale; H&Y: Hoehn & Yahr staging; MMSE: Mini Mental State Examination; HAMA: Hamilton Anxiety Rating Scale; PDQ-39: Parkinson's Disease Questionnaire-39; SCOPA-AUT: Scales for Outcomes in Parkinson's disease- Autonomic; NMSQ: Non-Motor Symptom Questionnaire; FSS: Fatigue Severity Scale; ESS: Epworth Sleepiness Scale; RBDSQ: Rem sleep Behavior Disorder Screening Questionnaire; RBD-HK: Rem sleep Behavior Disorder questionnaire - Hong Kong; MEQ-SA: Morningness - Eveningness questionnaire Self-Assessment version.

randomized controlled trials with larger samples are warranted to clarify the optimal parameters of photobiomodulation and objectively evaluate its effects in the PD population.

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Conflicts of interest

None.

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