The Effects of Exercise on Sleep in Individuals with Parkinson’s Disease

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Background

- Parkinson’s Disease (PD) is a neurodegenerative disorder that affects dopaminergic neurons in the substantia nigra of the brain. 1 PD is a hypokinetic movement disorder, which results in slowness of movement, tremor, lack of postural control, and rigidity of muscles. 1
- Sleep disturbances may be an early non-motor sign of PD, occurring even before typical motor symptoms. 1 Sleep disturbances can include poor sleep quality, sleep latency, decreased sleep duration, or daytime sleepiness. 2
- Individuals with PD are at a higher risk for developing sleep-related disorders such as insomnia. REM sleep behavior disorder, periodic leg movement disorder, restless leg syndromes, sleep attacks, sleep apnea, and nocturia. 3, 4 Individuals with PD experience sleep disturbances in individuals with PD. 5
- Sleep disturbances in individuals with PD are thought to be caused by a loss of an oxytocin/hypocretin, a hormone produced by the hypothalamus that regulates sleep. 6 This loss of oxytocin/hypocretin cells results in decreased activity in neurons that produce a chemical used for signaling between cells called dopamine. 7
- Pharmacological agents such as stimulants for daytime sleepiness and clonazepam or sleep aids to help with nighttime sleep have been shown to be effective in improving sleep in individuals with PD. 7 These drugs work by either prolonging the effects of dopamine, a chemical in the brain that plays a role in sleep, or by enhancing the effects of GABA, a chemical that reduces activity in the brain.
- Cognitive behavioral therapy, keeping a regular sleep schedule, and exercise have also been shown to be beneficial in decreasing sleep disturbances and managing symptoms associated with PD. 8
- Exercise has been explored as a possible effective option for managing symptoms in individuals with Parkinson’s Disease. 9 The positive results of exercise on sleep disturbances related to PD is thought to be due to the increased levels of dopamine in the brain after exercise. 10

Analysis of the Literature

- The results of the studies analyzed in this literature review demonstrate that exercise is effective in reducing sleep disturbances such as restless, hypervactive dreams, excessive daytime sleepiness, and sensorimotor symptoms and improving sleep quality in individuals with PD. However, comparison among studies is difficult for a few reasons. 11
- First, the studies assessed sleep using different outcome tools such as the Pittsburgh Sleep Quality Index, Mini-Sleep Questionnaire, Unified Parkinson’s Disease Rating Scale Sleep Subscale, and Parkinson’s Disease Sleep Scale. 11
- Next, the study by Silva-Batista et al. 12 excluded participants with PD who were diagnosed with insomnia, which is the most common sleeping disorder associated with PD and effects upwards of 80% of individuals with PD. 13
- Lastly, the studies by Coe et al. 14 and Frazzitta et al. 15 did not require that participants be on a regular pharmacological treatment. This is important because participants may have had a higher likelihood of experiencing symptoms associated with PD, which may have affected results when reporting scores for the outcome measures used to assess sleep.
- Nonetheless, many different forms of exercise were shown to be effective in improving sleep quality in individuals with PD. 16
- Silva-Batista et al. 12 showed that a resistance training program alone is effective while Nascimento et al. 17 and Coe et al. 14 and Frazzitta et al. 15 demonstrated that multidisciplinary exercise approaches were successful in improving sleep quality in individuals with PD.

Conclusion and Future Research

- In each study, individuals with PD showed improvement on the selected outcome tool to assess sleep; therefore, a variety of different exercise programs were beneficial in reducing sleep disturbances in patients with PD. 7
- While sleep is a non-motor symptom that is improved in individuals with PD, their daytime sleepiness decreases, allowing them to function more efficiently with ADLs and experience a better overall quality of life. 9
- Although the effects of exercise in the forms of resistance training and multimodal programs have been researched as demonstrated by this literature review, amplitude training is a more contemporary exercise approach that has the potential to improve non-motor symptoms in individuals with PD but has not been thoroughly reviewed.
- Another aspect future research should focus on is exercise intensity and exercise duration as that was not standardized across these studies.

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