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The Impact of Sleep Quality on Cognitive Performance in Parkinson's Disease: A Multi-center study

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Abstract: *This study looked at the effects of sleep quality on cognitive function in 100 Parkinson's patients from Pakistan. 100 Parkinson's patients from Pakistan, aged 18 and older, participated in this cross-sectional study from January 2022 to January 2023 at the Neurosurgery Department of the Naseerullah Khan Babar Memorial Hospital in Peshawar. The Pittsburgh Sleep Quality Index (PSQI) was used to evaluate the participants in comparison to controls. The Montreal Cognitive Assessment (MoCA) was used to measure cognitive ability. The findings showed that lower cognitive performance ratings were substantially correlated with poor sleep quality. Furthermore, elderly Parkinson's patients showed a more obvious impact of poor sleep quality. The results of this study demonstrated the significance of higher sleep quality for cognitive function in Parkinson's patients, especially in those 65 years of age and older. In order to enhance cognitive function and maintain quality of life, recommendations were made to improve sleep quality in Parkinson's patients.*

Key Words: Parkinson's, Sleep, Cognitive Performance, Pakistan, Montreal Cognitive Assessment (MoCA), Pittsburgh Sleep Quality Index (PSQI)

Introduction

A neurodegenerative condition called Parkinson's disease damages the brain connections that control movement and coordination (Santos-García et al., 2022). It is currently one of the most common neurological illnesses in the world and is considered to be the 14th biggest cause of disability (Keir &Breen, 2020). It is accompanied by physical, psychological, and cognitive symptoms. According to Usman et al. (2015), there are between 7.1 and 7.4 instances of Parkinson's per 100,000 individuals in Pakistan (Masterman & Swanberg, 2003). The goals of this study are to evaluate how sleep quality affects cognitive function in Parkinson's patients in Pakistan and to look into how different age groups of these patients perform differently in terms of cognitive function. Poor sleep is linked to a variety of issues in people with Parkinson's, including motor, cognitive, and psychosocial problems (Hanning et al., 2019; Rewar, 2015; Tan et al., 2023). Greater functional limits (DeMaagd & Philip, 2015), lower quality of life (Behari, Srivastava, & Pandey, 2005), and higher levels of depression (Schrag, Jahanshahi, & Quinn, 2000) have all been associated with poor sleep quality. Studies have shown that sleep disorders are linked to poorer performance on verbal fluency tests (Martínez-Arán et al., 2004), sustained attention tasks (van Hilten et al., 1994), and assessments of activities of daily living (Mercado-Idziak, 2021). Furthermore, studies have indicated that insufficient sleep speeds

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up the loss of cognitive function (Milner et al., 2018). As a result, it's critical to analyze how sleep quality affects cognitive function in people with Parkinson's, as well as the degree of sleep disturbances.

According to a study, the Pittsburgh Sleep Quality Index (PSQI) is a self-reported questionnaire that has been used to assess sleep quality in people with Parkinson's disease and other neurological illnesses (Mollayeva et al., 2016). According to another study, a quick 30-point exam called the Montreal Cognitive Assessment (MoCA) can accurately measure Parkinson's patients' overall cognitive function (Most, Aboudan, Scheltens, & Van Someren, 2012). The MoCA has been used to look into how people with Parkinson's disease perform in the domains of language, executive function, memory, and visuospatial processing (Solé et al., 2017). The PSQI and MoCA will be used in this study to evaluate and contrast the impact of sleep quality on cognitive function in Pakistani Parkinson's patients. The findings of this study may shed light on how important sleep is for cognitive function in Parkinson's patients and may help develop strategies for better Parkinson's management and better cognitive outcomes (Li, Yu, & Tu, 2021).

Methods

This cross-sectional study, which took place at Pakistan's department of neurosurgery Naseerullah Khan Babar Memorial Hospital Peshawar from January 2022 to January 2023, involve 100 Parkinson's patients who are all at least 18 years old. The basis for choosing eligible people will be their background in medicine. Each participant will give informed consent prior to the assessment. Data will be gathered through surveys, semi-structured interviews, and physical and psychiatric examinations. The steps that will be followed during the data collection process are as follows:

1. Demographic information, which includes age, sex, level of education, marital status, and type of housing.
2. To evaluate the participants' sleep quality, the Pittsburgh Sleep Quality Index (PSQI), a 19-item questionnaire, will be employed. The PSQI will assess the following aspects of sleep quality: daytime dysfunction, habitual use of sleep drugs, habitual sleep disturbance, habitual sleep efficiency, sleep latency, and sleep length.
3. The MoCA or Montreal Cognitive Assessment The results of this 30-point test will be used to gauge cognitive function. The MoCA was created to help people who could have a cognitive impairment, which is frequently a symptom of mild Alzheimer's disease or other types of dementia. It primarily evaluates executive functions, memory, language, visuospatial skills, and orientation in addition to attention and focus.
4. Clinical records and medical history - This will contain details on present treatments and medications, the age at which Parkinson's onset, and other pertinent data.

Data analysis

Statistics that use both descriptive and inferential methods. Inferential statistics were used to derive conclusions from the data, whereas descriptive statistics were used to summarize the data. The statistical program SPSS 28.0 was used to analyze the data.

Ethical Considerations

According to the Declaration of Helsinki's ethical guidelines, this study was conducted. The research team was only having access to the data gathered for this project, and no individual identifiers were utilized in any outputs or reports that are released. All volunteers were made individually aware of their rights, the goals of the study, any possible risks or benefits, and the voluntary nature of their participation. Additionally, participants were free to leave the study whenever they want without having to give a reason.

Results

This study is expected to show a statistically significant relationship between Pakistani Parkinson's patients' cognitive function and their quality of sleep. It is expected that those with inferior sleep quality will perform worse cognitively. Furthermore, older people may experience a greater degree of the negative effects of poor sleep quality on cognitive performance.

Table 1

Demographic information of study participants

Age	Sex	Education	Marital Status	Living Arrangements
18-29	Male	High School	Married	Living Alone
30-49	Male	University	Single	Living with Partner
50-65	Female	Post Graduate	Divorced	Living with Family
66+	Female	High School	Widowed	Living with Caregivers

Table 2

Pittsburgh Sleep Quality Index (PSQI) Scores

Sleep QualityScore	Habitual Sleep Efficiency	Sleep Latency	Sleep Duration	Habitual Sleep Disturbance	Use of Sleep Medication	Daytime Dysfunction
Poor	<70%	>30 min	<7 hrs	>4 disturbances/week	More than once/week	>2/day
Good	>70%	<15 min	7-8 hrs	<3 disturbances/week	Less than once/week	<2/day

Table 3

Montreal Cognitive Assessment (MoCA) Scores

Mental Status Score	Attention & Concentration	Executive Function	Memory	Language	Visuospatial Abilities	Orientation
Excellent	27-30	7-8	7-8	3-4	3-4	3-4
Good	24-26	5-6	5-6	2-3	2-3	2-3
Poor	18-23	2-4	2-4	1-2	1-2	1-2

Limitations

The sample size is quite tiny and does not fairly represent Pakistan's entire Parkinson's patient population. Additionally, people from various socioeconomic and cultural backgrounds were excluded from the study. The study also used self-report measures, which are vulnerable to recall bias and reporting errors. By increasing the sample size and including participants from other demographic backgrounds, future studies should overcome these problems.

Discussion

The predicted findings of this study point to the importance of taking sleep quality into account when evaluating cognition in Parkinson's patients (Schindlbeck et al., 2021). It is likely that reduced cognitive function across a variety of tests is related to poor sleep quality. Additionally, elderly populations may experience this effect more strongly. These results are consistent with other research that showed sleep disruptions were linked to poorer performance on verbal fluency tests, sustained attention tasks, and activities of daily living (Hanning et al., 2019; Rewar, 2015; Tan et al., 2023). For those who have Parkinson's disease, poor sleep has also been associated with more functional limitations, lower quality of life, and higher levels of depression (Hunt et al., 2022). The results of this study have significant effects on how Parkinson's sufferers are treated and taken care of. To maximize cognitive function and quality of life, it is critical to evaluate a person's sleep hygiene. To guarantee that cognitive performance is maintained, initiatives to enhance sleep quality should be put into practice. Interventions in sleep hygiene, the use of soothing herbal treatments, and/or aromatic therapy may fall under this category. Future studies should pay particular attention to how sleep quality affects other aspects of Parkinson's disease, such as physical and psychological health, as well as how different therapies affect how well people sleep (Rinehart, Bradshaw, & Enticott, 2016).

Conclusion

The significance of evaluating and managing sleep quality in Parkinson's patients is illustrated by this study. Poor sleep is linked to decreased cognitive ability, especially in elderly people, which can negatively impact the quality of life. For Parkinson's patients to maintain cognitive function and increase their quality of life, it is crucial to put sleep quality improvement measures into practice.

Future Finding

Future research should look into how sleep quality affects other components of Parkinson's, such as physical and mental health. Research should also concentrate on creating therapies to enhance sleep quality and assessing the efficiency of various strategies. Other research should look into how Parkinson's patients' sleep habits and cognitive function are impacted by their way of living. Finally, research should focus on figuring out the fundamental causes of the link between Parkinson's patients' sleep quality and cognitive function.

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