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Wearable Neurotechnology: Tracking sleep and cognitive health in neurological patients.

Vedangi Ajay Gander[1], Digvijay Shankar Bhoslae[1]

MD, Alte University, Tbilisi, Georgia [1]

Key Points

Question:
How effective are wearable neurotechnology's in tracking sleep and cognitive health in neurological patients?
Can wearable devices aid in the early detection and management of neurological disorders?
What are the challenges associated with integrating wearable data into clinical workflows?

Findings:
Transcranial electrical stimulation (tES) improves sleep onset latency and overall sleep quality in insomnia patients.
Fitness trackers can detect early signs of Alzheimer's disease by identifying distinct activity patterns.

Meaning:
Wearable neurotechnology provides a non-invasive and accessible tool for tracking sleep and cognitive health. These devices hold promise for early detection and continuous monitoring of neurological disorders.

Abstract

Importance:
In the past a decade wearable neurotechnology has become a revolutionary tool for tracking sleep and cognitive function in neurologically deficit patients. By providing an accessible and non-invasive way to collect important information about behaviour and neural activity outside clinical settings.

Objective:
The main aim of this study is to determine the use of wearable devices in monitoring sleep and mental health in neurological disorders.

Evidence Review
A systematic review conducted on Science Direct, PubMed and Google Scholar databases. A total of 11 articles were reviewed, dated from the years 2020 to 2024. Inclusion criteria involved any type of study which examines the wearable devices used for patients with Insomnia, Alzheimer's and Parkinson's diseases. The PCC framework was used for quality assessment of the articles.

Findings
Transcranial electrical stimulation (tES) devices have been shown in studies to successfully lower sleep onset latency and enhance overall sleep quality in people with insomnia. A further finding was that, even before clinical symptoms manifest, fitness trackers could identify distinct activity patterns in people with brain beta amyloid proteins, a defining feature of Alzheimer's disease. When paired with an iPhone, consumer gadgets such as the Apple Watch can identify changes in Parkinson symptoms over time in people who are still in the early stages of the disease, according to another research.

Conclusions and Relevance:
This study examines the latest developments in wearable neurotechnology, emphasizing its uses, advantages, and drawbacks in the diagnosis and treatment of neurological conditions. Important issues like accuracy, data privacy, and integrating wearable data into clinical workflows are also covered, highlighting the necessity of additional study and regulatory frameworks.

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References

Kontaxis S, Kanellos F, Ntanis A, Kostikis N, Konitsiotis S, Rigas G. An Inertial-Based Wearable System for Monitoring Vital Signs during Sleep. Sensors. 2024;24(13):4139. https://doi.org/10.3390/s24134139

Simons SB, Provo M, Yanoschak A, et al. A randomized study on the effect of a wearable device using 0.75 Hz transcranial electrical stimulation on sleep onset insomnia. Frontiers in Neuroscience. 2024;18. https://doi.org/10.3389/fnins.2024.1427462

Jaiswal SJ, Pawelek JB, Warshawsky S, et al. Using New Technologies and Wearables for Characterizing Sleep in Population-based Studies. Current sleep medicine reports. 2024;10(1):82-92. https://doi.org/10.1007/s40675-023-00272-7

Kehnemouyi YM, Coleman TP, Tass PA. Emerging wearable technologies for multisystem monitoring and treatment of Parkinson's disease: a narrative review. Frontiers in Network Physiology. 2024;4. https://doi.org/10.3389/fnetp.2024.1354211

Loukou E. Fitness trackers could spot earliest signs of Alzheimer's BEFORE symptoms start... The Sun. Published online March 19, 2024. https://doi.org/10847393582.jpg?1710847418

Farnaz AbbasiMoradi, Mogavero MP, Palomino M, Ferri R, DelRosso L. Age related disparities in sleep apnea diagnosis using a wearable device: Implications of 4% vs. 3% hypopnea scoring criteria. Sleep medicine. Published online April 1, 2024. https://doi.org/10.1016/j.sleep.2024.03.046

Bensen-Boakes DB, Murali T, Lovato N, Lack L, Scott H. Wearable Device-Delivered Intensive Sleep Retraining as an Adjunctive Treatment to Kickstart Cognitive-Behavioral Therapy for Insomnia. Sleep Medicine Clinics. 2023;18(1):49-57. https://doi.org/10.1016/j.jsmc.2022.09.006

Alharbi E, Somayah Albaradei, Magbubah Essack, Jones JM, Akram Alomainy. Wearable devices developed to support dementia detection, monitoring, and intervention. Elsevier eBooks. Published online October 4, 2024:223-250. https://doi.org/10.1016/b978-0-443-13619-1.00012-x

Kubicki M, Ryan JT, Shaw JM, Depner CM. Overview: wearable devices for monitoring sleep and circadian physiology. In: Academic Press; 2023:1-5. https://doi.org/10.1016/B978-0-12-822963-7.00198-5

Spina MA, Andrillon T, Wiley JF, Rajaratnam SMW, Bei B. Does changing perceptions of sleep byincorporating sleep wearables improve insomnia? Protocol for a randomized study (the Novel Insomnia Treatment Experiment). SLEEP Advances. 2023;4(1). https://doi.org/10.1093/sleepadvances/zpad012

Johnson KT, Picard RW. Advancing Neuroscience through Wearable Devices. Neuron. 2020;108(1):8-12. https://doi.org/10.1016/j.neuron.2020.09.030

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Corresponding Author: Vedangi Ajay Gander, MD, Alte University, Tbilisi, Georgia.
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