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Enhancing Balance and Mobility Rehabilitation in Diabetic Neuropathy through Virtual Reality: A Review

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ABSTRACT

Diabetic Peripheral Neuropathy (DPN) is a prevalent complication of diabetes characterised by sensory deficits, proprioceptive loss, neuropathic pain, and gait disturbances, which signifi cantly impair functional independence and increase fall risk. Conventional physiotherapy addresses these impairments but may be limited by low patient engagement and insuffi cient sensory feedback. Virtual Reality (VR) provides immersive, interactive environments that enhance motor learning, sensory integration, and neuroplasticity, thereby offering potential therapeutic advantages in DPN rehabilitation.

A scoping review was conducted following the framework of Arksey and O'Malley. Electronic databases including PubMed, PEDro, Scopus were systematically searched using relevant key terms. Studies were screened by title and abstract, and those evaluating VR interventions in individuals with DPN were included. Data on participant characteristics, intervention protocols, and outcomes were descriptively analysed.

A total of 243 records were identified, with nine studies meeting inclusion criteria. VR interventions demonstrated significant improvements in postural stability, gait parameters, sensory feedback, pain modulation, and functional mobility compared to conventional therapy alone.

VR shows considerable potential as an adjunct to physiotherapy for DPN rehabilitation. Further randomised controlled trials are required to establish standardised protocols and long-term efficacy.

Keywords: Balance training, CNS dysfunctions, Gait rehabilitation, Neurological dysfunction, Neurorehabilitation

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