

Mapping the Applications of Wearable Technology in the Management of Knee Osteoarthritis: A Scoping Review

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ABSTRACT

Introduction: Knee Osteoarthritis (KOA) is a major cause of disability worldwide affecting gait, stability, balance, physical activity and ultimately quality of life. Wearable technology is an emerging tool for assessment and real-time remote monitoring in the rehabilitation of KOA. The extent of research on its applications, effectiveness, availability and clinical integration is still limited.

Aim: To identify the types of wearable devices and analyse their applications and effectiveness in KOA rehabilitation.

Methods: Literature search conducted across Pubmed, Scopus, IEEE Xplore and Google scholar with keywords: 'wearable technology,' 'knee osteoarthritis,' 'remote monitoring,' and 'smart devices' yielded 1226 articles. After duplicates removal, 751 articles were screened based on inclusion criteria: RCT, cross-sectional, cohort and experimental studies focusing on wearable technology applications in KOA published in English between 2014-2024. Studies using AI-based diagnostics without wearable rehabilitation applications, non-KOA population and surgical interventions were excluded. Ultimately, 9 studies after full text screening were included and analysed for wearable device types, clinical applications and improvement in patient's outcomes.

Results: Smart insoles, motion sensors, accelerometers, knee monitoring devices and smart watches were primary wearable devices identified in studies. They were implemented for real time symptom tracking, assessment, physical activity monitoring and rehabilitation feedback. Improvement in mobility, pain and adherence to rehabilitation were seen in some studies while others identified challenges related to useability, patient compliance and long-term effectiveness.

Conclusion: Wearable devices in KOA management emphasised on objective assessment and personalised rehabilitation. However, long term adherence, accuracy and clinical integration are still the primary challenges. Future research should focus on standardisation of wearable-based assessments and their integration in clinical protocols.

Implications: Findings of this review support the need for user-friendly, clinically validated and adaptable wearable devices to enhance patient outcomes. It encourages clinicians to incorporate wearable devices in rehabilitation.

Keywords: Wearable technology, Knee osteoarthritis, Remote monitoring, Smart devices

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