Smart Wearables for Chronic Kidney Disease Management

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Abstract

One of the most troublesome chronic illnesses that pose serious worldwide healthcare issues is chronic kidney disease (CKD). For instance, it is challenging to detect and treat chronic kidney disease (CKD) and related conditions with conventional methods. Wearable technology has become a cutting-edge tool for managing and diagnosing CDK. Although wearable technology and digital health are gaining popularity, there is currently a dearth of research that explicitly suggests practical methods for using smart wearables to forecast CKD. There is a clear lack of solid evidence showing that wearables can be used directly to predict the development of CKD in the future or its rate of progression, despite the fact that current research shows their potential for general health monitoring, risk stratification, and managing comorbidities in CKD patients (e.g., cardiovascular parameters, physical activity, adherence to self-management). For these crucial CKD care components, further targeted research is required to create and test particular predictive algorithms and intervention models using wearable-derived data. To forecast CKD and create a framework for managing this chronic illness, the UCI CKD dataset was utilised. Supervised and unsupervised machine learning algorithms were utilised to detect CKD progression early on, forecast acute episodes, and personalise treatment adherence strategies. It was crucial to build features from time-series data that incorporate a variety of measures such as heart rate variability, sleep patterns, and physical activity level. The findings show that predictive analytics can enable proactive healthcare, optimise resource allocation, and improve patient participation, resulting in more effective and personalised CKD management.

Keywords
Chronic Kidney Disease (CKD), Wearable Technology, Machine Learning, Predictive Analytics, Digital Health.