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GAIT-CKD (Gait Analysis using Artificial Intelligence for digital Therapeutics of patients with Chronic Kidney Disease): design and methods

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Objectives: As the digital transformation of medical systems is accelerating around the world, 'digital Therapeutics' is attracting attention. Digital Therapeutics is a digital technology with 'proven treatment effect'. It is to 'directly treat and manage' patients' diseases and disabilities. In chronic kidney disease, gait has the potential to be an important biomarker for determining the patient's health status and the effectiveness of interventions. So far, it is known that gait speed is reduced in CKD, but other information of gait parameter is limited. In this study, the pathological gait characteristics of CKD were studied as baseline data for the development of digital therapeutics.

Methods: We performed BIA measurement, time up and go, Tinetti, grip strength test, and gait analysis in 217 normal population and 276 patients with chronic kidney disease (CKD) to identify the characteristics of pathological gait.

Results: Demographic information including underlying disease and medication, laboratory tests, and quality of life satisfaction surveys were collected. Skeleton data, which is a gait analysis, acquired three-dimensional skeleton data of a walker using a single Kinect sensor, and verified whether normal population and CKD patients were distinguished through an RNN-based classification model. In addition, some of these subjects got a health intervention through app and checked whether there was an improvement in gait after 8 weeks. In the case of patients, the events of fall down, fracture, hospitalization, and death at the 1st and 3rd years will be investigated.

Conclusions: In this study, it was confirmed that the gait of normal population and CKD patients were different, and the effect of the health intervention through a smartphone app for 8 weeks will be analyzed. We are sure that it will be an important baseline data for creating digital therapeutics for CKD patients' diet/exercise in the future.