Assessment of outcomes in motor scales, gait parameters, and non-motor symptoms

All subjects underwent comprehensive Parkinson’s disease (PD) evaluation including history taking, neurological examination, determination of Hoehn and Yahr stage, and motor function severity. The degree of motor function severity was quantified using the Unified Parkinson’s Disease Rating Scale (UPDRS). For consistent evaluation, we always assessed the UPDRS at 9:00 am. Balance and gait function were assessed using the Tinetti scale, which includes 17 items. The items were divided into two domains: balance (9 items, 16 points) and gait (8 items, 12 points). The scores on the Tinetti scale range from 0–28, with higher scores indicating better balance and gait function.

All subjects underwent comprehensive gait evaluation regarding spatial and temporal parameters of gait dynamics using the GAITRite system (CIR System Inc., Franklin, NJ, USA) with a 4.6-meter-long walkway. Average spatiotemporal parameters such as gait velocity, cadence, step length, and step length covariance were calculated after the subject walked forward 10 times.

Non-motor symptoms were assessed using the Non-Motor Symptoms Scale (NMSS), which contains 30 items. The scores on the NMSS range from 0–360, with higher scores indicating higher severity and frequency of non-motor symptoms. Depression was assessed using the Montgomery-Asberg Depression Rating Scale (MADRS), which includes 10 items, each scored from 0–6 points. The total score on the MADRS ranges from 0–60, with higher scores indicating more severe depression. Quality of life (QoL) of patients with PD was assessed using the Parkinson’s Disease Questionnaire-39 (PDQ-39), which is composed of 39 items to cover the eight domains of mobility, activities of daily living, emotional well-being, stigma, social support, cognition, communication, and body discomfort. The scores on the PDQ-39 range from 0–100, with higher scores indicating poor QoL.