

Individual variation of gait characteristics along a 500 meter walk in people with multiple sclerosis and healthy volunteers

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Background : We previously demonstrated the usefulness of the Deceleration Index (DI, the ratio between the last 100m of the Timed 500-Meter Walk test –T500MW – and the walking speed - WS – of the Timed 25-Foot Walk Test with a propelled start – T25FW⁺) to evaluate motor fatigue over a long walking distance in people with multiple sclerosis (pwMS). We also recently designed and internally validated a new gait analysis tool for pwMS (GAIMS) that can measure other relevant gait characteristics than the sole WS, such as ataxia, asymmetry and perhaps spasticity.

Aims : (i) To compare various gait characteristics between the last and the first 100m of the T500MW in a population of pwMS and healthy volunteers (HV), (ii) to compare the ratio between the last and the first 100m of the T500MW with the DI, and (iii) their relationship with the EDSS.

Methods : Subjects were asked to perform the T25FW⁺ and the T500MW as part of a multimodal evaluation at the MS Clinic of the CHU of Liège. Their gait characteristics were measured using GAIMS. (i) Paired Student's t-tests were performed on various gait characteristics extracted during the last and first 100m of the T500MW with .05 as a level of significance, (ii) Spearman correlation coefficient (ρ) was calculated (ii) between these ratio and (iii) subject's EDSS.

Results : Seventy-one pwMS and 129 were enrolled in our study. (i) Significant differences were observed for speed related gait characteristics between the last and first 100m of the T500MW, but also for gait characteristics related to ataxia and precision of foot placement. (ii) A moderate positive correlation was observed between the WS ratio of the last and first 100m of the T500MW and the DI. (iii) The correlation between the DI and the EDSS was weakly negative, while the one between the last and first 100m of the T500MW ratio and the EDSS was moderately negative.

Conclusion : (i) As previously demonstrated, we here confirm that alongside to WS, there are other gait features affected by locomotor fatigue over a long walking distance, (ii) the moderate positive correlation between the DI and the last/first 100m of the T500MW indicates that these measures are not the same and that next to a long distance walking test such as the T500MW, a short one such as the T25FW⁺ remains useful. (iii) The last/first 100m of the T500MW is better correlated to the EDSS and might be a better predictive tool of pwMS' neurologic state than the DI.