ABSTRACT

Title: Presence and Influencing Factors of Motor Fatigue during Six-Minute Walk Test in Multiple Sclerosis.

Background: Ambulation impairment limits daily activities in persons with Multiple Sclerosis (pwMS), even more pronounced in the presence of motor fatigue. Previous studies reported a continuous slowing down of the walking pace during the Six-Minute Walk test (6MWT) in persons with moderate to severe ambulatory dysfunction. However, it is not known whether motor fatigue during walking is present in all pwMS and how it relates to person characteristics such as disability level, type of MS or disease duration.

Methods*:* Data from the cross-sectional RIMS multi-centre study with 208 ambulatory pwMS from 10 European and 1 US centres were used. Expanded Disability Status Scale (EDSS) ranged from 0 to 6.5. PwMS were evaluated with the 6MWT as well as other walking measures (Timed Up and Go - TUG, Timed 25 Foot Walk - T25FW, Timed 10 Meter Walk Test – T10MW, Multiple Sclerosis Walking Scale-12 - MSWS-12) and the Modified Fatigue Impact Scale (MFIS) which assesses overall fatigue impact on daily life. Subjects were stratified into two subgroups with and without motor fatigue, defined as 20% threshold decline of distance walked during first compared to last minute of the 6MWT (Motor Fatigued Group, n=47; Non Motor Fatigued Group, n=161). Prevalence of motor fatigue according to disability level and type of MS was reported. T-test, Mann/Whitney test and Chi-square test were used to investigate difference between the subgroups. Correlation coefficients between motor fatigue subgroups and patient characteristics (age, gender, disease duration, Body Mass Index - BMI), walking measures (6MWT, TUG, T25WT, T10MW, MSWS-12) and MFIS were calculated.

Results: Motor Fatigue occurred in 22.6% of pwMS. Prevalence of motor fatigue increased significantly with increasing disability level (EDSS 0-2.5, 4%; EDSS 3-4, 9.3%; EDSS 4.5-5.5, 32.1%; EDSS 6, 36.6%; EDSS > 6, 45.7%; $p < 0.01$). Moreover

prevalence of motor fatigue was significantly higher in progressive MS compared to relapsing remitting (RR) MS (secondary progressive MS 20.5%, primary progressive MS 30.8% RR 10.8%; $p < 0.01$). Results of all waking measures showed significant differences within two subgroups ($p < 0.01$). Significant correlations were found between motor fatigue, as determined during the 6MWT, walking measures, type of MS and EDSS. Correlations were non-significant for age, gender, disease duration, BMI and MFIS.

Conclusion: One quarter of the pwMS showed motor fatigue during 6MWT according to our 20% decline criterion. Motor fatigue prevalence is associated with increasing disability level (EDSS and walking ability/capacity) as well as with type of MS.

Key words: Multiple Sclerosis, Motor Fatigue, Ambulation/Walking/Gait, 6MWT