

Evaluation of walking performance of two groups of the subjects with multiple sclerosis (ataxic and spastic), compared to normal subjects

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Background: Multiple Sclerosis (MS) is one of the most common neurodegenerative disorders, which influence on abilities of the subjects during standing and walking. The **objective** of this study was to evaluate spatiotemporal gait, ground reaction forces (GRFs), kinematic and asymmetries in GRFs in two different clinical forms of MS compared with normal human gait.

Methods: 21 females with MS (ataxia, n=11 and spastic symptoms, n=10) and ten healthy women participated in the study. A Qualysis motion analysis system and a Kistler force plate were used to measure variables of spatiotemporal, and GRFs components and kinematic during the gait. Moreover, a symmetry index (SI) was calculated for GRFs variables. The difference between the mentioned parameters of both groups was determined based on two sample t test.

Results: The ataxic group's performance in walking was significantly lower than that of the spastic and normal groups ($P < 0.001$). Vertical valley force, vertical second peak (Fz3), breaking (Fy1) and progressive (Fy2) forces were lower in MS groups ($P < 0.001$). The asymmetries in GRFs were greater during MS gait.



Conclusions: The push-off forces decreased in MS gait. Symmetry index in Fz3, Fy1 and Fy2 are appropriate components for exposition asymmetry during MS gait. There was significant difference between kinematic variables of normal and MS subjects, which should be considered in rehabilitation program used for this group of the subjects.

Key words: multiple sclerosis, spatiotemporal gait, ground reaction force, gait symmetry

