SUMMARY

Background: Regular physical activity and physiotherapy positively influence the health and physical condition of people with multiple sclerosis (MS). These activities support neuroplasticity of the brain, which can lead to a slowing down of clinical progression. However, the mechanism of this recovery is still not well documented. Nevertheless, imaging methods are currently widely used to help to create a better understanding of the pathophysiological and consequent reparative processes in MS.

Aims: This study aims to demonstrate changes in clinical functions, functional activity and brain connectivity (by functional Magnetic Resonance Imaging - fMRI) in MS patients after two months of physiotherapy. It seeks to clarify the preventive importance of regular physiotherapy, and also to provide further insights into the pathophysiological and neuroplastic processes in MS patients.

Methods: This is a prospective randomized experimental study with longitudinal observation. People with MS (N = 38) were divided into two groups and underwent a two-month ambulatory physiotherapy program (1 hour, twice a week of neuroproprioceptive „facilitation, inhibiton“ therapy). A clinical examination and fMRI examination were carried out one month before, just before, just after and a month after the end of the therapeutic program. In healthy volunteers (N = 42) one fMRI examination was performed.

Results: Changes in functional brain activation (in cerebellum, supplementary motor region and premotor region) were noted in connection with an improvement of the clinical condition of the individual patients after the therapy. Also, in the connectivity analysis, minor changes were observed after therapy (increase in centrality). Healthy participants had better activation as well as better connectivity of the brain regions than the participants with MS. The clinical status of people with MS improved in two parameters (cognitive test and walk test) after two months of treatment. In addition, the subjective perception of illness by patients was better.

Conclusions: The study brings new insights into functional brain activity and connectivity in MS patients and reveals that these functions can be influenced by physiotherapy (in connection with the improvement of clinical functions). The findings of this and similar studies could help lead to the inclusion of physiotherapy as the basic pillar of prevention of MS progression.