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Editorial Open Access

Understanding and Treating Cognitive Function Deficits in Multiple Sclerosis

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Editorial

Multiple sclerosis (MS) is a neurodegenerative disease of the central nervous system that is frequently associated with cognitive deficits, depression and fatigue. These factors cause decreased quality of life, social withdrawal, and unemployment [1]. Patients with MS have less exposure to different types of activity: professional and social, and are more likely to psychiatric disorders especially depression. Cognitive impairment in MS patients is heterogeneous. In some of them cognitive disturbances don't occur in any form, in others such symptoms can be the cause of severe and progressive form of the disease from the beginning, even prior to physical disability. Approximately half of all people with MS (40-60%) will develop problems with cognition. Most studies indicate that cognitive impairment is more common in patients with primary or secondary progressive than relapsing-release type of MS and slightly more in the secondary than primary progressive form of disease. Cognition refers to a range of high-level brain functions. Most common symptoms, which are observed in MS, are: episodic memory, sustained attention, problems with concentration, verbal fluency, processing speed, executive function, visuospatial functions. Cognitive impairment in MS is better known due to neuropsychological research studies and neuroimaging. Cognitive dysfunction correlates to brain magnetic resonance imaging (MRI) lesion volumes and (regional) atrophy, and degree of increase in MRI abnormalities predict further worsening [2]. However the diagnosis of the cognition impairment is based on neuropsychological examination. Screening tools are the Brief Repeatable Neuropsychological Battery, Symbol Digit Modalities Test and Audio Recorded Cognitive Screen. The Minimal Assessment of Cognitive Function in Multiple Sclerosis (MS) is used for standard neuropsychological evaluation. Based on the test findings - including the person's cognitive deficits and strengths- the physician should provide cognitive rehabilitation.

Comprehensive rehabilitation programs are mainly focused on improving mobility and functioning in daily routine.

There is no evidence-based symptomatic drug treatment for the cognition impairment. The most successful has been donepezil hydrochloride, showing modest improvement in verbal memory [3]. There is some others like: ginkgo biloba, rivastigmine, and memantine, but none of these compounds demonstrated beneficial, reproducible improvements in cognitive function in clinical trials with MS. Among non-pharmacological interventions, Cognitive deficits, especially mild cognitive impairment (MCI) could represent an ideal target for cognitive training, retaining a large range of cognitive capacities to learn and apply new strategies on memory skills.

However the cognition therapy program should also include: computer-mediated memory exercises, computerized and manual cognitive exercises, psychological therapy and aerobic training. There is increasing evidence that physical activity supports memory. Aerobic activity, in particular, improves cardiovascular system and, based on recently reported findings, may also have effects on cognition among people with neurological disorders. Accumulating data show that aerobic training might improve cognition and change brain glucose metabolism in areas related to cognition in subjects with MCI [4]. Other studies suggest that aerobic exercise might have an impact on increase connectivity and hippocampal volume as well as improve memory.

According to current knowledge aerobic work out not only improves mobility, balance, and motor function but can also enhance cognitive function by upregulation of some neurotrophins, such as brain derived neurotrophic factor (BDNF). Gathered data proves positive influence on cognitive function and BDNF levels increase, training exercises should consist of: (1) sessions of aerobic exercises longer than 30 minutes, intensity of exercises 70% maximum heart rate, occurring 4 days a week with both resistance and aerobic exercises combined. High-intensity intervals and cycling could be remarkably efficient when it comes to immediate benefit of acute aerobic training on cognitive function; nevertheless evidence also exists that only 30 minutes of aerobic training at 60% heart rate max. is very effective for patients with chronic disease and results in increase of BDNF levels [5]. Aerobic work out represents a totally natural, widely available, costless therapy with no side effects that may be the effective memory therapy not only for MS patients. Another and very modern forms of non-pharmacological therapy are based on computer programs for independent motor and cognitive exercises usually created by neurorehabilitation and neuropsychology experts. They are individually tailored for patients needs. Moreover; those programs are very often used as telemedicine, what is very important especially in rural regions. In this type of therapy patients can realize their tasks on their own computers at home, which allow them to get motivated to exercise daily and see the results. Tasks are designed to be both a pleasure and a challenge. They can also verify the effectiveness of their exercises and therapy on a regular basis.

Cognitive rehabilitation in MS patients is still in its infancy. Cognitive behavioral therapy, as aerobic work out, and education programs are promising psychosocial interventions to improve coping and lessen cognitive symptoms [6]. There is a need for better ways of diagnosing and treating cognitive problems not only in MS but also in

other neurodegenerative disorders and aging [7]. Early recognition, assessment and treatment are important because cognitive changes can significantly affect a patient's quality of life and are the primary cause of early departure from the work force. More studies are needed for future directions of research and clinical practice with regard to sustainable exercise interventions for people with MS. Aerobic training and computer cognitive exercises are a promising intervention for MCI in MS patients [8].

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