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The role of hippotherapy in improving the balance and gait parameters of patients with multiple sclerosis: A narrative review

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Abstract
Multiple sclerosis (MS) is a neurological disease characterized by the onset of movement disorders such as spasticity, fatigue, ataxia and pain. Hippotherapy helps to improve balance, endurance, increase orthostatic control, self-confidence and muscle strength. The aim of this review is to describe recent research data on the effects of hippotherapy in patients with MS. The PubMed and Google Scholar databases were searched with the following keywords: multiple sclerosis, hippotherapy, rehabilitation. This review included both clinical trials and systematic reviews. In conclusion, it seems that the application of hippotherapy both as an individual treatment and in combination with other physiotherapy methods can contribute to the improvement of motor disorders, mental health, quality of life and functioning in the performance of daily activities in people with MS.

Keywords: Multiple sclerosis, hippotherapy, rehabilitation

Introduction
Multiple sclerosis (MS) is a chronic autoimmune, inflammatory neurological disease of the central nervous system (CNS), attacking the myelinated axons of the CNS, destroying myelin and axons to varying degrees [1]. Its course varies and is unpredictable. In most patients, the disease is initially characterized by episodes of reversible neurological deficits, which are often followed by progressive neurological deterioration over time [2].
Common symptoms are spasticity, fatigue, sexual dysfunction, bladder dysfunction, pain and cognitive impairment. Other symptoms include depression, bowel dysfunction, paroxysmal symptoms and weakness [3].
The incidence of the disease increases with increasing latitude. It is most common in northern Europe, Canada, the northern United States and Australia. In areas of southern Europe, the prevalence is between 10-40 per 100000. In our country it is at 29.5. Near the equator the frequency is less than 5 in 100000. The disease is more common in women than in men (1.5:1). The most common age of onset is in young adults (20-30), but the onset of the disease is not uncommon even in the fifth decade of life. It is rare to start before the age of 15 and after the age of 60 [3, 4].
Physiotherapy has been shown to help reduce spasticity [5], ataxia [6] and to increase functional movements and balance [7].
Hippotherapy can effectively help the motor and emotional problems of patients with MS, with very important benefits such as increasing orthostatic control, self-confidence and muscle strength and improving balance, aerobic endurance and functional skills [8, 9]. A horse rehabilitation program has as its main goal the improvement and maintenance of the functional condition of the patient, taking into account the activity disproportionate fatigue of MS patients [9]. Thus, the hippotherapy program is designed to help the patient feel comfortable, have fun, relax, boost their self-confidence and make them feel integrated into society as they were before the onset of the disease.
The aim of this review is to describe recent research data on the effects of hippotherapy in patients with MS.

Literature review

The PubMed and Google Scholar databases were searched with the following keywords: multiple sclerosis, hippotherapy, rehabilitation. This review included both clinical trials and systematic reviews. Below are the main findings of the articles included in this review.

Hammer *et al*. [10] studied the efficacy of hippotherapy in 11 patients with MS. The intervention included 10 weekly 30-minute sessions. The Berg Balance Scale (BBS), the Figure of Eight Walk test, the Timed Up-and -Go (TUG) test, 10-meter walking, the modified Ashworth scale, the Index of Muscle Function, the Birgitta Lindmark motor assessment as well as the Visual Analog Scale (VAS) for pain, the scale for self-rated level of muscle tension (SRLMT), the Patient-Specific Functional Scale for ADL, and the 36-Item Short Form (SF-36) questionnaire were evaluated before and after the intervention. The results mainly showed an improvement in balance and emotional area (subcategory of SF-36). However, less significant benefits were presented in other areas such as walking in the figure of eight, gait speed and endurance, pain, spasticity and functioning for performing daily activities.

Moreover, Silkwood-Sherer and Warmbier [11] also studied the efficacy of hippotherapy in improving balance and posture in 15 people with MS (24-72 years old). These individuals were assessed for their balance with the BBS and the Tinetti Performance-Oriented Mobility Assessment (POMA). Nine people received weekly hippotherapy for 14 weeks and the remaining six served as a control group. The measurements were performed before and after the intervention. The results showed a significant improvement in balance for the hippotherapy group compared to the control group. However, the researchers noted that further investigation is needed to improve hippotherapy protocols and inclusion criteria for participants.

In their systematic review, Bronson *et al*. [12] studied the efficacy of hippotherapy in improving balance in people with MS. Their review included three clinical studies, which reported on their results improvements in balance and more specifically on the BBS score. In addition, the authors report that improvements have been observed in the quality of life of these individuals.

Furthermore, Munoz-Lasa *et al*. [13] studied the efficacy of hippotherapy in terms of balance and gait in 27 patients with MS. Patients were divided into two groups, 12 of them underwent therapeutic riding and the remaining 15 underwent traditional physiotherapy. Both groups performed two sessions per week for 10 weeks. The Extended Disability Status Scale (EDSS), Barthel Index, Tinetti POMA and gait analysis were evaluated before and after the intervention. The results showed an improvement in the POMA score and gait parameters (improvement of stride time and reactions by ground forces) in the hippotherapy group after the intervention in relation to the control group. The researchers concluded that hippotherapy seems to improve balance as well as some gait parameters in patients with MS.

Long [9] suggests hippotherapy to improve the balance, strength, coordination and postural symmetry of people with MS, as well as self-confidence. According to the author, the therapeutic effect of hippotherapy is based on the three-dimensional movement of the horse, i.e., the saddle on three axes. The author suggests that this movement provides the rider with different sensory elements to improve their gait. While this treatment is passive, the person must engage their trunk muscles to sit upright and straighten their body as the horse moves, thus contributing to orthostatic stability and strengthening of the trunk muscles.

Lindroth *et al*. [14] studied the efficacy of hippotherapy in postural control, changes in balance and functional gait in people with MS. Their pilot study involved three people and lasted six weeks with 12 40-minute physiotherapy sessions that included hippotherapy twice a week. The results showed sensory improvement, improvement in balance and functioning. In addition, two of the three participants did not rely on vision alone after the intervention, but had gained control of the orthostatic information for orthostatic control.

Vermöhlen *et al*. [15] studied the efficacy of hippotherapy in balance, fatigue, pain, quality of life and spasticity in 70 adults with MS. The participants were randomly divided into two groups. In one group, hippotherapy was applied for 12 weeks, while in the other, a standard intervention was performed. The results showed an improvement in balance (BBS score), fatigue, pain, quality of life and spasticity (Multiple Sclerosis Quality of Life-54 questionnaire) in the intervention group after the program compared to the control group. The authors concluded that hippotherapy combined with standard care helps to improve the symptoms of MS.

Lastly, Moraes *et al*. [8] studied the effects of hippotherapy on gait parameters in people with MS. Their study involved 32 participants, who were divided into two groups: 17 were placed in the hippotherapy intervention group and 16 in the control group. The intervention included 16 sessions of 30 minutes of hippotherapy performed twice a week for eight weeks. The 25-foot walk test (T25FW) and the 6-minute walk test (6MWT), as well as the spatiotemporal gait evaluation using the GaitRite system were assessed before and after the intervention. The results showed significant post-intervention improvements for the intervention group compared to the control group. More specifically, the distance of the 6MWT was significantly increased while the test time of the T25FW was reduced. Additionally, the average support time and the double support time during the walking cycle were reduced. The researchers pointed out that hippotherapy helps to improve gait parameters in people with MS.

Discussion - Conclusions

The results of this review show that hippotherapy can significantly contribute to the improvement of balance and gait parameters in patients with MS. It also improves the emotional area, quality of life and functioning in performing daily activities. The improvement of all the above results in the better posture of the patient, which becomes more symmetrical. The aforementioned benefits are seen after six weeks, while the average session time is 30-40 minutes and with a frequency of two times a week.

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